VOL. 15. NO. 4 APR 10 1917 Registered in U. S. Patent Office APRIL, 1917

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW.

$1.00 Per Year 99 JOHN STREET, NEW YORK 10 Cents Per Copy

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

Contents, Page 166 Directories, Page 61 Want Ads, Page 72 Index to Advertisements, Page 81

THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW.

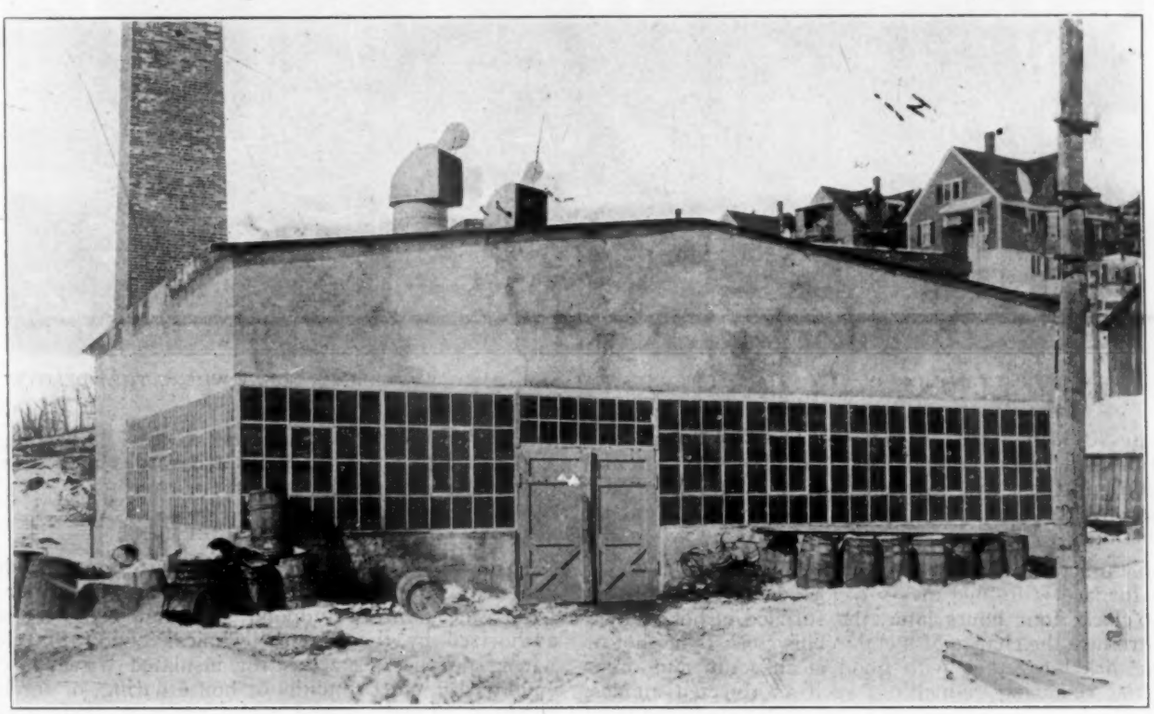
Vol. 15. NEW YORK, APRIL, 1917. No. 4.

THE MANUFACTURE OF NICKEL ANODES

A Brief Description of a Model Foundry Built for This Purpose.

By L. J. Krom.

The problems attending the production of nickel anodes for electroplating purposes do not, as a general thing, trouble the electro-plater. As long as the anode dissolves smoothly and furnishes him with the necessary metal for his bath, does not crumble away too quickly, does not give something to the bath that stains his deposit or causes it to flake or peel, he is satisfied and continues to use the same brand. But just as soon as something goes wrong he becomes very much interested in the origin of his anodes and there is trouble right away for the manufacturer of them.



THE NICKEL ANODE FOUNDRY OF THE APOTHECARIES HALL COMPANY, WATERBURY, CONN.

It has been said that there are seventeen ways to lose a casting of iron and it is no exaggeration to say that there are an equal number of ways to make a bad anode. There is required extreme care in the melting of the stock, the metal must not be over-heated, it must not be exposed to oxidizing influence, it must be kept free from impurities which may enter it from the fuel or flux. Coupled with the mechanical problems are the requirements that chemically the anode must conform to certain definite laws. It must have the right percentage of nickel, iron, tin, zinc, carbon, etc., that are required for the various purposes for which it is to be used. Then the anode must be poured at the proper temperature and speed. An anode poured too hot or too fast will be porous and will not last long in the bath. An anode poured too cold or too slowly will not be coherent, but will have "cold shuts" and flaws, which will cause it to fall apart in the solution. The sand used to make the mold (for anodes are cast in sand) is a very important part of the process. The sand should have a good body and while porous enough to allow of the escape of the gases, it should be able to withstand the cutting effect of the nickel. If not, the anode will present an unsightly appearance, having a pitted surface into which the particles of sand are embedded. This, while perhaps not seriously interfering with the after life of the anode, may cause its rejection by the customer with subsequent loss in remelting.

In the foundry shown in the illustration accompanying this article the Apothecaries Hall Company, of Waterbury, Conn., manufacture their well-known brand of Deloye anodes and others. Here, in the specially built building are melted every day 3,000 pounds or more of nickel. In this foundry, which is sixty feet square, is located the melting furnace, which can be seen in Fig. 2. This furnace, which was installed by the Oil and Furnace Engineer Company, New York, has been described in THE METAL INDUSTRY for April, 1916, so it will not be necessary to repeat it here, except to say that this particular furnace melts a charge of upwards of 3,500 pounds of nickel in five hours. All the precautions incidental to the melting, pouring and molding of nickel anodes that I have mentioned above are carefully observed by the Apothecaries Hall Company in their little foundry on Manhan street, under the supervision of G. B. Rice, who will be glad to explain their manufacture to any enquiring plater. Two grades of anodes are made plain flat. The sizes also vary, according to the demand of the customers.

Just before the metal is poured the door at the side of the furnace opposite the tap spout is opened far enough to permit of the drawing off of the slag. As this slag always carries a little nickel it is afterwards crushed up and the nickel recovered by means of a magnet machine. After the bath of upwards of 3,500 pounds of nickel has been properly skimmed, the molds for the anode castings are placed on trucks running on a narrow gauge railroad and brought up to the pouring spout. When all is ready the melter punches a hole through the breast of the furnace and the stream of white, hot, glistening metal comes surging down the clay-lined runway of the spout to tumble into the safe haven of the sand mold. As each mold is filled the truck is moved along and each truck load of molds is followed by another. This goes on until all the metal has been drained from the furnace, the hearth of which has a slight slope to the pouring spout. After the molds have all been poured they are piled up at

INTERIOR OF THE FOUNDRY OF THE APOTHECARIES HALL COMPANY, WATERBURY, CONN., WHERE THE "DELOYE" ANODES ARE MADE.

by the 90-92 per cent. nickel and the 95-97 per cent. The balance of the composition is made up of iron and carbon and these are introduced at the will of the customer so that he, at all times, will know just what he is getting.

The practice in force at this foundry is as follows: The furnace is lighted at six o'clock in the morning, at ten o'clock, four hours later, the furnace is hot enough to introduce the charge of metal. This consists of shot or grain nickel together with good clean scrap and other material requiring re-melting, such as rejected anodes, etc. The heat of the furnace is gradually increased until the metal is melted and when this has been accomplished a damper in the flue is lowered and the temperature so regulated that the metal is kept close to 3,000 degrees Fahr., which is the pouring temperature. While the metal is being melted the foundry force are busily engaged in cleaning up the castings of the previous day's run, weighing, packing and shipping. The molders are making molds of sand for the orders of the day. A number of shapes are made by this company such as the Deloye or herring bone, the oval, corrugated and the one end of the shop and allowed to cool, when the castings are shaken out, the gates and sprues cut off and the day's work of the foundry force is over.

ZINC WIRE IN GERMANY

It is stated that German manufacturers are producing zinc wire which is but slightly inferior to copper wire from a mechanical standpoint. The new zinc wire is now authorized by the Electro-technical Union for electric wiring purposes, such as for insulated wires or cables employed in steel conduits or house wiring, or for larger conduits. Lead covered cables are now made with the conductors in zinc.

The main advantage of zinc over iron lies in the fact that zinc has double the electric conductivity of iron, and, besides, it is non-magnetic. Again, zinc wire is more flexible than iron, hence it works better upon insulators; and another point is that it does not need to be protected from rust. It took some time, however, for the new wire or cables to enter into practice, especially as during the first stages the manufacture of it was far from perfect, but these troubles are now over.

A MODERN DEVELOPMENT IN POLISHING AND PLATING STEEL AUTOMOBILE LAMP REFLECTORS

A Description of an Ingenious Machine Now in Daily Use

Written for The Metal Industry by Charles H. Proctor

The automobile industry, from its inception up to the present time, has been one of the great wonders of the industrial world and its remarkable development in mechanical and electrical features from a layman's standpoint is beyond comprehension. Within a little more than two decades more patents have been granted to the automobile and allied industries than the sum total of other industries, and to-day it stands pre-eminently one of the greatest, if not the greatest, industry in the commercial world when the thousand and one industries that are allied with it are considered.

The amount of capital invested in the industry probably totals a billion of dollars and when we realize that only about twenty years ago this industry was still in the experimental stage it is indeed remarkable that it has reached such a tremendous state of development. It is not my intention to cover in detail the manufacture of automobiles or the many kindred parts which are electro-plated in endless variety, but to give in detail the modern development of the automobile lamp industry and more especially the reflectors, which, at the present time, are being made by the millions from pressed sheet steel. A few years ago not only the reflector but the lamp body itself was made from sheet brass exclusively, but the manufacture of the lamp body was an expensive proposition, as much manual labor was required in the production of the type of lamp then in vogue.

Finally the manufacturer, as well as the consumer, realized that lamps made from brass were not only expensive but the labor entailed in keeping the lamp polished in order to present a respectable appearance was folly. The steel lamp body was eventually developed and the rapid advance in the method of illumination from acetylene gas and kerosene oil to the more modern electric light enabled the manufacturers to produce a type of lamp that could be manufactured more cheaply and conform to the new lines in automobile bodies. The experiment of finishing the lamp body with an imitation hard rubber finish by the use of baking japans proved so successful that this finish has been used almost exclusively on the lamps and other steel parts exposed to atmospheric influence and which go to make up the equipment of the modern automobile.

The European War has had an important bearing upon the automobile industry in regard to the tremendous advance in the cost of production of raw materials and it was for this reason that the automobile lamp manufacturers were eventually driven to the use of sheet steel for making silver-plated lamp reflectors. The extremely high price of brass was the factor in the adoption of steel, but the ease with which the brass was

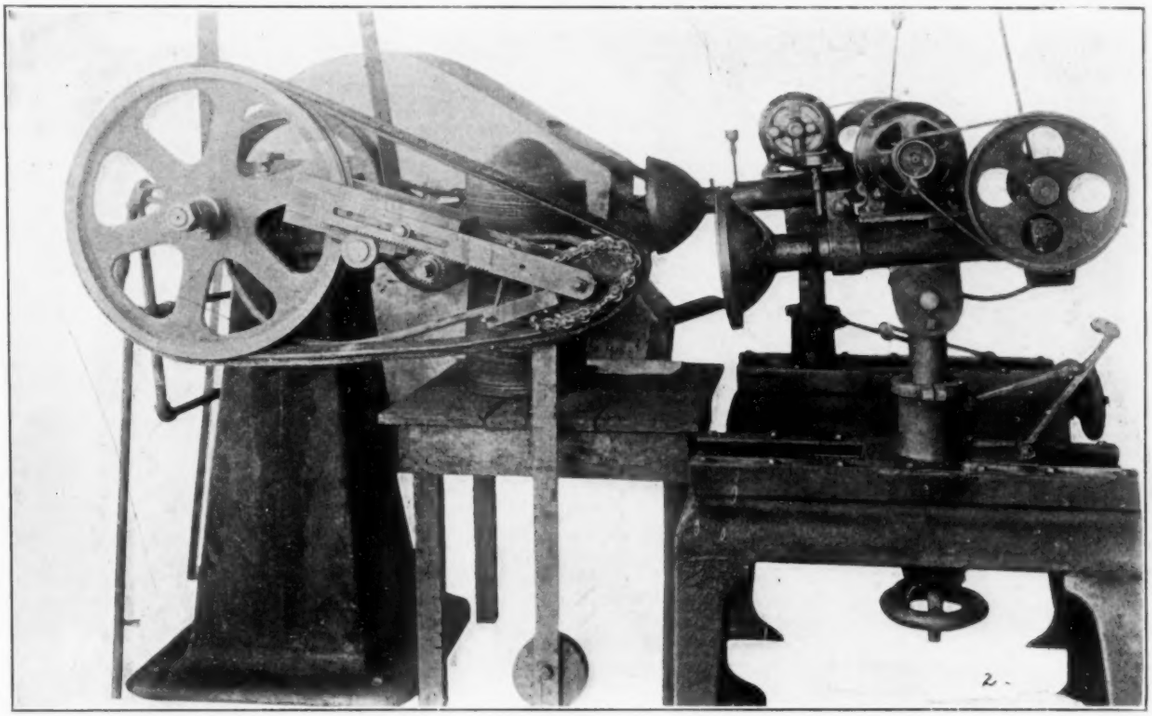


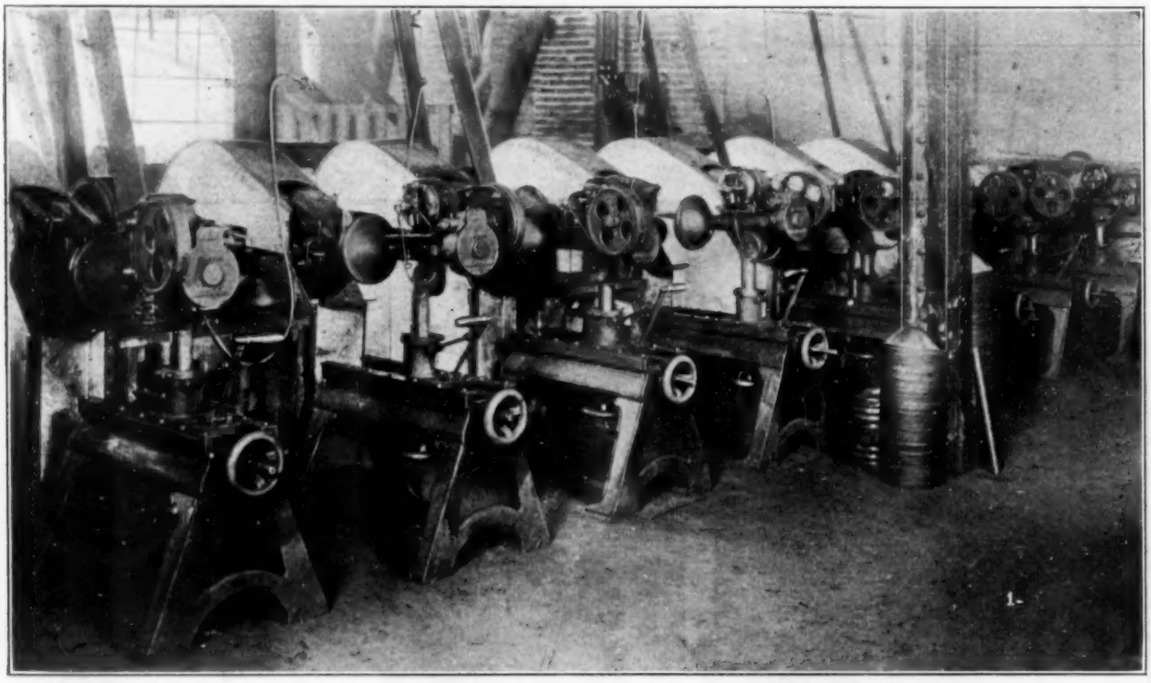
FIG. 1 SHOWS STRAIGHT IN-DRIVE MACHINE DESIGNED AND BUILT FOR POLISHING AND BUFFING PARABOLIC REFLECTORS. THIS MACHINE CONSISTS OF A STANDARD WITH BED UPON WHICH A SLIDING HEAD STOCK WITH INDIVIDUAL MOTOR DRIVEN SPINDLE CAN BE MOVED, FORWARD OR AFT, WITH A VERTICAL ADJUSTMENT, ALSO A STANDARD SUPPORTING DRIVE PULLEY, AND ADJUSTABLE FOOT, BETWEEN WHICH THE POLISHING BELT IS STRETCHED. THE ADJUSTABLE FOOT CONSISTS OF A STEEL FORM WITH A HARDENED TUBULAR ROLLER CHAIN, WHICH CONFORMS TO THE PARABOLIC SURFACE TO BE POLISHED.

manipulated, the simple methods of producing a polished surface and the methods of plating, also the value of scrap material, prevented many of the manufacturers from adopting steel. Many concerns waited to see what could be done by others, and finally competition was the deciding factor and to-day probably ninety-five per cent of all the reflectors used in automobile lamps are made from steel.

In the adoption of steel a number of difficulties, even in the mechanical production, were met with, as steel does not draw in press operations as readily as brass, but these problems were finally overcome. In the finishing of the lamp body all that was necessary was to produce a clean surface, and this was formerly done by the aid of gasolene or benzine, then by the use of electro cleaners and finally the adoption of the combination cleaning and plating solution; for not only was the cleansing accomplished, but a thin coating of copper was deposited which produced a better surface for the enamels or japans that were applied. Another feature which was the outcome of the use of the combination cleaning and plating solution was the fact that the lamp bodies could be carried in stock as the coating of copper prevented the surface from rusting. This rust previously had to be removed from the bodies that were carried in stock otherwise the rust would show up through the enameled or japanned coating.,

The most perplexing problem encountered in connection with the steel reflectors was to produce a highly finished reflective surface. In the use of brass, which is much softer than steel, no difficulties were found in the polishing operations and the product could be readily handled with many different types of mechanical buffing machines. But with steel it was an entirely different proposition, as lines and scratches were more difficult to remove and the economic cost of production had to be taken into consideration, otherwise the extra cost entailed in finishing the steel would more than counter-balance the extra cost of brass and in that case there would be no advantage in using steel. To the laymen lines and scratches in a reflective surface would not appear to be much of a detriment in the parabolic type of reflectors in use. Theoretically, parabolic reflectors will reflect all the light rays from its focus in parallel rays, but practically this would not be true unless the very fine lines made on the surface by polishing and buffing agents conformed with the outline of a parabola. If such a mirror surface as required for reflective purposes was polished with a wheel running at right angles with the axis of the reflector it would produce minute lines that would form circles whose axis would be concentric with that of the mirror surface. The result of such lines upon a polished surface would be the diffusing of light out of their parallel rays.

It was the production of such a surface as noted that presented the problem with steel; many concerns started out right while others started wrong, only to find out that experience that costs the most is longest to be remembered. Not only was it necessary to produce a smooth surface upon the steel, but the next problem was to produce a lustre upon this smooth surface of the steel without unnecessary cost of labor and materials, especially in the use of silver deposited on the reflector. Silver, of all metals, on account of its extremely white nature, produces the highest reflective surface, proportionately to its lustre.



A BATTERY OF WEBB POLISHING MACHINES WORKING ON LAMP REFLECTORS.

The changing over from using brass to the use of steel, of course, necessitated an enormous change in tank and electrical equipment in the plating departments of automobile lamp concerns. Many of the equipment concerns, realizing the value of the copper sulphate solutions in the electrotyping industry, emphasized the importance and economy of using such a type of solution in the deposition of heavy coatings of copper to produce the necessary lustre deposit upon the steel. Some of the representative men in such concerns went so far in their statements as to say that by the use of the acid copper solutions polishing of the steel surface could almost be eliminated and lines and scratches in the steel would be readily covered up. The mere elimination of

labor was the all-consuming factor to the manufacturer and he was deceived by such statements and installed his new equipment in many instances accordingly, only to realize in the end that he had spent thousands of dollars foolishly. If he had studied the laws of electrolysis he would have known that a metal surface containing lines, indentations and scratches of depth will not cover up, but that the same surface will develop as the plating goes on to any thickness. The final polishing may produce a lustre, but the lines of imperfection will remain.

Then again the excessive amount of copper deposited inside and out on the reflectors was an expensive proposition and amounted to at least twice as much as the labor in preliminary polishing, for the copper deposited was wanted on the inside, but not on the outside of the reflector. The writer worked diligently with the large concerns in the middle West until he proved his contentions, and to-day all the large lamp concerns are working upon an equitable basis.

The first factor in plating steel reflectors is the polishing operations. The low cost and simplicity of these operations are amply verified by the use of the Webb polishing machine, shown in Fig. 1, which has been adopted as the most efficient polishing machine for parabolic surfaces. The machine consists of a standard with a bed upon which a sliding head stock is securely connected with an individual motor-driven spindle which can be moved to and fro as desired, also with a vertical adjustment. A standard supports the drive pulley and adjustable parts between which the polishing belt is stretched. The adjustable foot consists of a steel form with a hardened tubular roller-chain which conforms to the parabolic surface of the reflector to be polished. The polishing belt consists of tufts of unbleached heavy muslin. The polishing medium used in the polishing operations is a white composition which is applied to the tufts of the belt during the operation. Dry emery or alundum (140 grade) is flown upon the tufts from a funnel and this accomplishes the polishing. An arrangement is included with the machine so that the dry polishing material is constantly conveyed to the polishing belt and can be used over and over again. Unless the steel surface contains extra deep grooves or scratches one operation is all that is necessary and one man can attend to several of these machines at one time. The time required for polishing is from thirty seconds to a minute.

The next step after polishing is the cleaning of the surface of the reflectors, but as comparatively no oily or greasy substances are used in the polishing operations the cleaning of the polished surface is readily accomplished. For this purpose any of the commercial cleaners in the market may be used either as immersion or electro-cleaners. However, in many of the plants a combination cleaning and copper-plating solution is used. This type of solution cleans and plates at the same time and is not only used for the cleaning and preliminary plating of the reflectors, but, as above mentioned, for the lamp bodies as a basic deposit before enameling or japanning. The solution that has proven very successful as a combination solution is composed as follows:

Water	1	gallon
Caustic soda, 78%	3	ounces
Soda ash, 58%	3	ounces
Aluminum silicate	¼	ounce
Sodium cyanide	1½	ounces
Copper cyanide	1¼	ounces

The solution is maintained in an iron tank with facilities for heating the solution to the boiling point, although the best results are obtained at 180 degrees Fahr. The voltage should be from six to eight and the amperage as high as fifty or sixty per square foot of surface. The positive connections may be made direct to the tank and several copper anodes should be used to maintain the metal content. This type of solution produces very heavy deposits of copper in a few minutes. It is customary, however, to use a regular copper solution to produce a sufficiently heavy copper deposit upon the steel reflectors, so after the preliminary deposit in the combination solution the following gives a rapid and heavy deposit in from ten to twenty minutes time:

Water	1	gallon
Sodium cyanide	4½	ounces
Copper cyanide	4	ounces
Soda ash	2	ounces
Caustic soda	¾	ounce
Sodium hyposulphite	¼	ounce

Iron, steel or wooden tanks may be used, the temperature of the solution should be 120 degrees Fahr., voltage two and one-half to four amperage from fifteen to twenty per square foot of surface. After the reflectors have been copper plated they should be washed and dried.

The next operation is to color the copper plated surface with white compositions to produce a high lustre. The coloring operations may be either by machine or hand labor, for with a soft uniform deposit of copper a lustre may be readily produced. Following the coloring of the copper deposit cleaning is again resorted to and a dilute solution of any of the well known cleaners on the market may be used for the purpose, but not more than four ounces of any material should be used per gallon of water. The temperature of the cleaning solution should be about 200 degrees Fahr. About four to six ounces of causterised soda ash per gallon of water with the addition of a quarter to half ounce of sodium silicate makes an excellent cleaner and should be used at 180 to 200 degrees Fahr., either as a still or an electro cleaner. After the cleaning operation the usual cyanide dip is used for removing superficial oxidization of the surface which may have developed in cleaning. For this purpose the proportions should be as follows:

Water	1	gallon
Sodium cyanide	3	ounces

After the cyanide dip and re-washing in water the reflectors are ready for nickel plating. Single nickel salts are exclusively used in the nickel solutions and the proportions of materials that give the best results are as follows:

Water	1	gallon
Single nickel salts	12	ounces
Boracic acid	2	ounces
Epsom salts	1	ounce

The temperature should be normal, voltage two and one-half to three and one-half and amperage 10 to 15 per square foot of surface. The time of immersion in the nickel solution does not exceed three to four minutes, the idea being to produce a basic surface for the silver deposit. After nickel plating the reflectors are again washed in clean cold water and then "struck" in the silver strike solution consisting of the following:

Water	1	gallon
Sodium cyanide	6	ounces
Silver cyanide	½	ounce
Caustic soda	¼	ounce

It is customary to use anodes of hardened sheet steel with small strips of silver attached instead of anodes made exclusively of silver. The voltage should be from three to four and the time of immersion about twenty seconds at 15 to 20 amperes per square foot of surface in order to produce a thin rapid clear preliminary

deposit of silver to cover over the nickel surface, and if this is not accomplished quickly the silver does not adhere well to the nickel. From the silver strike the reflectors are plated in the regular silver solution for a period of from three to five minutes at one to two volts and with a normal temperature. This solution is composed as follows:

Water	1	gallon
Sodium cyanide	2¾	ounces
Silver cyanide 80½%	2	ounces
Caustic soda	¼	ounce

The reflectors, after silver plating, should be thoroughly washed in cold and boiling waters for several minutes, then dried thoroughly at a temperature exceeding 212 degrees, so that all the moisture in the pores of the metal will be absorbed. Particular attention should be paid to washing and drying before the final coloring of the silver deposit, for on the effectiveness of these operations will depend whether "spotting out" will develop in the humid season of the summer time. The final coloring of the silver deposit is accomplished by soft buffs made up from canton flannel. The polishing medium used is kerosene oil and lamp black or jewelers' gold rouge and denatured alcohol.

This completes the operations of polishing, plating and finishing the automobile lamp reflectors produced to-day. The assembling and wiring of the reflectors in the lamp bodies are all that is necessary to complete the entire operation.

There has been considerable discussion as to the possibilities of the steel reflectors finally rusting under the influence of moisture while in use. We do not believe this will occur due to the following favorable conditions. The lamps are fairly water tight and on account of the use of electric lights, there is no necessity of opening them constantly. The heat generated by the electric light would be sufficient to eliminate any moisture that might get into the lamp due to occasional opening. Under the old system of gas or kerosene lighting, however, steel reflectors would have been an absolute failure, owing to the exposure of the reflectors to moisture conditions through the opening vents necessary for combustion in this type of lighting.

In tropical climates, however, where moisture, due to humidity in excessive quantities, is always present, rusting may develop in a very limited time. However, the manufacturer can readily overcome this trouble should it develop. A rust free coating upon steel may be readily produced by the elimination of the copper deposit and substitution of zinc. The nickeling of the zinc may cause a little difficulty, but if necessary the nickel may be discarded. The combination of the zinc, nickel and silver would give a rust free-coating. For depositing zinc upon the steel reflector the following solution gives excellent results:

Water	1	gallon
Sodium cyanide	2¼	ounces
Zinc cyanide	3	ounces
Commercial sodium hydroxide	2½	ounces
Aluminum sulphate	¼	ounce

The solution should be prepared in iron or steel tanks, although wood may be used. The temperature should be 110 to 120 degrees Fahr., voltage two to four and time of deposit ten minutes. Zinc anodes are used and in order to facilitate rapidity of deposit small insert anodes should be used inside of the reflectors while plating. Such insert anodes can be arranged as fixtures, so that the distance from the inside walls of the reflector may always be of equal distance. This method can be arranged in a simple manner. After zinc plating the surface may be polished, cleansed and plated in a special nickel solution.

Water	1	gallon
Single nickel salts	12	ounces
Magnesium sulphate	2	ounces
Sodium citrate	4	ounces

Voltage from two and one-half to four and temperature normal. To avoid black streaks in the deposit the neutrality of the solution must be maintained by the addition of very dilute solution of caustic soda to neutralize the free acid which rapidly develops. The final silver plating then follows.

REFINISHING SILVER-PLATED FLATWARE.

The refinishing of worn silver plated steel knives and forks is not a difficult proposition as the polishing depends upon the condition of the surface of the articles.

The polishing may be accomplished in two or three operations, viz: first wheel, 120 emery; second wheel, 160 emery, and the finishing wheel, 200 emery. The polishing medium should be tripoli.

It is advisable to remove the silver from the old knives as this silver will help to give a profit. The knives can be made the anodes in the silver solution so that when plating the silver will be reduced and re-deposited upon other work. Or you can prepare a cyanide solution consisting of about 6 ounces to a gallon of water and make the knives the anodes and use a piece of sheet steel for the cathode, that is, use a reversed current. When the steel becomes coated with silver it can be used as an anode for plating as long as any silver remains.

After silver plating if a good smooth surface has been previously prepared on the surface of the knives, they may be cut a very little with tripoli, but it must be a very light cut. Then color on a soft wheel using lamp black and kerosene oil or jewelers' gold rouge and denatured alcohol.

The method of plating should be as follows: Cleanse in an electro-cleaner which should be used hot or near the boiling point and should consist of the following:

Water	1	gallon
Soda ash	8	ounces
Water glass	¼	ounce

Use sheet steel as the anode and after cleansing for a minute or so with a good current at 5 to 6 volts, wash in water then immerse in a muriatic dip, consisting of half acid and half water, then rewash in water and strike in a silver strike consisting of

Water	1	gallon
Sodium cyanide	6	ounces
Silver cyanide	⅛	ounce

Use steel anodes with a small piece of copper. This strike should only show a shadow of silver on the knives and from this first strike immerse the articles in the second strike.

Water	1	gallon
Sodium cyanide	4	ounces
Silver cyanide	½	ounce

Then plate in a regular silver solution consisting of at least 3 ounces of silver cyanide and 4 ounces of sodium cyanide per gallon of water. For a second or triple plate you would have to plate from 45 minutes to 1 hour and a quarter, depending of course upon the amount of silver in the solution.

At the present price of silver, allowing a half pennyweight per knife, the actual cost of labor and material should be about 48 cents per dozen. The cost for plating the forks should be about the same. To this cost must be added incidentals and profits so the refinishing of knives would be worth at least $1.00 per dozen.—C. H. P.

ANTI-FRICTION METAL

SOME RESULTS OF PRACTICAL INVESTIGATIONS OF THE PHYSICAL PROPERTIES OF COPPER IN LEAD AND ANTIMONY ALLOYS.

WRITTEN FOR THE METAL INDUSTRY BY G. C. HOLDER.

The development of the anti-friction metal has been caused by the needs of the engineering world. This need was first taken advantage of by Isaac Babbit in 1839, who first compounded the metal which now bears his name. Genuine Babbitt is in reality a pewter metal, which is a tin alloy hardened by copper and antimony.

Formerly, knowing the composition of an alloy was deemed sufficient, but the day has gone by when the man in the possession of a little book containing different formulae deemed himself sufficiently entrenched so as to make himself indispensable; method of compounding and melting, pouring temperature and the rate of cooling did not enter into a foreman's career.

The studying of different fluxes did not enter into the question with him. But to-day, that is, generally speaking, all of the above conditions enter greatly into present day production.

Before the advent of anti-friction metal, the bearings were generally a copper-tin alloy, the nature of this alloy caused many a delay, simply because it was not plastic enough to adapt itself to conditions or irregularites of the journal, producing thereby hot journals.

The soft anti-friction metal was able to overcome this objection, and it is therefore readily recognized with what degree of popularity this alloy was taken up. Not only has it been a great aid to engineers, but also has overcome great difficulty in machine design. It has also gained favor from an economic standpoint, in that it lowered the amount of friction, which consumes energy. that energy being produced by fuel.

The mere fact that a user of anti-friction alloy is content to use any kind of an alloy is not sufficient, as load and speed play a very important part in the rendition of economy and satisfaction, a fact which is brought out by experience with an automatic machine on which different tin and lead base alloys were tried, but with no degree of satisfaction, until an alloy consisting of 88.08% zinc, 9.67% copper, 2.25% aluminum, was tried, which proved to be just the thing they wanted. The condition in this case was high speed and a small load.

That speed in bearings is indeed of importance is deduced from the fact that two formulae are used to calculate friction. The formula for friction at a speed of over 500 ft. per minute, according to Lasché, is $f = 51.2 \div p (t - 32)$, in which f = friction, p = pressure on projected area of bearing in pounds, per square inch, and t, final bearing temperature degrees in Fahrenheit. The other formula for speed below 500 feet per square inch, derived by Mr. Axel Pederson, is as follows $f = 2.3V \div p (t - 32)$, in which V = rubbing speed of journal in feet per minute, the other letters representing the same thing as in the previous formula.

CONTROL OF FOUNDRY.

The control of foundry regulations relative to melting of white metals is of very great importance, as well as chemical analysis of finished product and reclamation of scrap.

The correct analysis of scrap anti-friction metal relative to impurities is self-evident. The impurities generally considered in a lead, antimony alloy are tin, zinc, aluminum and copper, tin not so much so as the last three; zinc from its physical nature alone bears too great a relation to antimony to permit it to enter into combination, and zinc when heated becomes very granular, and therefore easily broken, causing the bearing to disintegrate at a lower temperature. Copper in small quantities combines with antimony or tin separating in six-rayed stars of great hardness, the formula being either according to Charpy Cu_3 Su or Cu_3 Sb. Aluminum, because of its low affinity for lead, is objectionable. Then, too, according to well established experimental data, elements with low atomic volume increase friction, while those of high atomic volume decrease it. Aluminum falling into the low atomic volume class causes increase of friction.

Foundry regulations and fluxes play an important part. The method of blending or combining the higher melting metals with the low melting ones is an important phase. Take the manufacture of genuine Babbitt, consisting of 88.90% tin, 3.70% copper, 7.40% antimony. The method in vogue in a large foundry is as follows: Instead of introducing the metals haphazardly or melting them according to their respective melting point, the copper is melted, then a portion of the tin, then antimony added, after thorough stirring it is poured into suitable molds or chills. Then melt the remainder of the tin, and add the above combination of copper, antimony and tin. The more refractory materials are always melted in graphite crucibles. After the metal has once been compounded, it can very readily be melted in an iron kettle, unless the alloy contains zinc or phosphorus. In that case it would attack the receptacle.

TEMPERATURE REGULATION.

The regulation of temperature for heating and keeping the metal at a molten state is likewise important. In overheating in the case of lead and antimony alloy the volatilizing of antimony ensues. In the case of tin base alloy tin oxides (SnO_2) are formed, which are highly refractory and cause a loss of that metal, thereby causing the formula to deviate from its supposed constituent.

Theoretically the molten metal is supposed to rid itself of any foreign substance, that is to say, it is supposed to come to the surface and allow itself to be skimmed off. However, actual practice does not bear it out, therefore, in the case of scrap material, and it is also an excellent practice when virgin metal is used to make use of numerous practices, such as inserting a green piece of wood in the molten bath or injecting superheated steam, causing the molten bath to be agitated, and bring the foreign substance to the surface mechanically; constant agitation tends also to prevent segregation, provided, of course, the necessary precautions are taken for causing sudden chilling when the metal is poured into chills or molds. (The usage of green wood prevents overheating or rather the tendency to do so, because, as is well known, the introduction of moisture into a too hot molten bath causes it to fly or spatter.)

The question of a suitable covering for the molten bath is one of great importance. Charcoal, while an excellent covering, is not satisfactory, generally because of its not being compact enough. Powdered charcoal or graphite are too readily blown from the bath. Rosin, or, better still, tallow, because melted tallow being very mobile, immediately covers the broken surface when the dipper or ladle is inserted, and each time a certain portion is dipped out, the film of the bath is broken, and but

for the protection of the above a new crop of oxides would be formed.

Oxides being prevented no fluxes are necessary. Sal. ammoniac or ammonium chloride is used in case they are formed because of lack of covering. However, a combination of Manganese Sulphate ($MnSo_4$), together with powdered charcoal is a very efficient flux when properly used. When the flux is placed in the bottom of the melting pot and the alloy is placed on top, the metal seeps through this filter and any dirt is strained out of the metal. The oxides, with the exception of tin are reduced and kept reduced because of the following reaction, which keeps the bath in a reducing atmosphere ($MnSo_4 + 4C$) $= MnS + 4\ CO$).

The refining of scrap material is likewise important. If the analysis of the scrap shows high copper content, and it is desired to be lowered, sulphur is introduced, causing copper sulphide, allowing it to be skimmed off as dross. In case the alloy is contaminated with aluminum, litharge is used, causing aluminum oxide (Al_2O_3), which also is skimmed off. Zinc can be volatilized, but in the case of tin, the calculation must make an allowance, in case tin is considered an impurity. Total impurities are always taken care of by calculation.

The selling of dross or skimmings is an unwise practice, which is done by some concerns. The most refractory of materials being an oxide of tin, the reclaiming of which is attended with by some difficulties, but can be accomplished by the proper heat and the following fluxes, which are used in assay work, and are known as Black Flux (proper), which consists of 1 part potassium nitrate (KNO_3) and 3 parts crude bitartrate of potassium ($KHC_4\ H_4\ O_6$); the Black Flux substitute consists of 3 parts flour and 10 parts sodium bicarbonate ($NaHCO_3$).

The rate of chilling a bearing is of vital importance. Slow chilling causes segregation and promotes crystal growth. Therefore, the above condition produces variances of physical properties.

The entectic of lead and antimony alloy contains 13% antimony, the remainder lead. It is practically the only entectic used in engineering, the reason being that practically no mechanical strain other than compression is placed upon it. The alloy on either side of the entectic consists of a solid solution, surrounded by the entectic. The compressive strength increases with the percentage of antimony until the entectic is reached. Beyond this there is very slight increase, due to the fact that antimony is scattered and merely transmits the loads to the entectic in which they are embedded. High antimony, for example, 20% and over, the antimony crystals touch each other and carry a portion of the load, the alloy being very brittle.

Below are some of the physical properties of the white metal anti-friction alloys.

Composition.	Load at Elastic Limit Per Sq. In.	Ultimate Load Per Sq. In.	Per Cent. Elong. in 2 Inches.	Brinell Hardness.	Melting Point.
Sn 90.62 Sb 7.81 Cu 1.46	5,415	9,706	7%	19.4	492° F.
Sn 82 Bb 12 Cu 6	5,777	10,400	2%	28.4	505° F.
Sn (tin) 53.00 Sb (antimony) 10.60 Cu (copper) 2.40 Pb (lead) 33.00	5,477	7,454	1%	23.4	469° F.
Sn 10 Sb 18 Cu 2 Pb 70	4,886	8,181	1%	25.0	507° F.
Sn 35 Sb 17 Cu 4 Pb 44	5,840	6,818	1%	28.0	605° F.
Sn 88.90 Sb 7.40 Cu 3.70	7,108	10,120	5%	19.65	500° F.	1,100° F.
Pb 72 Sb 18 Sn 10	4,647	9,497	1%	28.5	500° F.	900° F.
Pb 83⅓ Sn 8⅓ Sb 8⅓	4,976	10,520	5%	17.6	500° F.	740° F.
Pb 87 Sb 13	4,468	8,464	3%	14.9	500° F.	900° F
Sn 83⅓ Cu 8⅓ Sb 8⅓	5,127	10,730	3%	24.16	500° F.	1,060° F.
Pb 74.63 Sb 18.82 Sn 6.38 Cu .10	4,387	8,406	1%	21.3	500° F.	900° F.
Pb 85 Sn 5 Sb 10	3,035	8,896	4%	15.2	.....	.....
Pb 86.99 Sn 1.54 Sb 11.47	3,516	7,602	5%	....	.....	.....

Composition.		Load at Elastic Limit Per Sq. In.	Ultimate Load Per Sq. In.	Per Cent. Elong. in 2 Inches.	Brinell Hardness.	Melting Point.	Pouring Temperature.
Pb	90	3,667	7,910	11%	18	490° F.	.....
Sb	10						
Sn	2	2,850	6,574	2%	20.8	502° F.	.....
Sb	12						
Pb	86						

87 LEAD AND 13 ANTIMONY.

	5 Minutes. Test No. 1.	Test No. 2.	½ Hour. No. 1.	No. 2.	End of Test. No. 1.	No. 2.	Total Revol. Test No. 1.	Test No. 2.
Temperature of bearing	147.8°—149.3° F.		182—178.1		203° F.	197° F.	935,360	976,110
Temperature of room	80—77		80—77		80	75	.....	.....
Friction in pounds	5.209—4.8333		2.9585—2.823		2.208	2.073	.....	.....

LEAD, 72.54; ANTIMONY, 20.01; TIN, 7.08; COPPER, .04.

	5 Minutes. Test No. 1.	Test No. 2.	½ Hour. Test No. 1.	Test No. 2.	End of Test. No. 1.	No. 2.	Total Revol. No. 1.	No. 2.
Temperature of bearing	137° F.	136° F.	166° F.	162.5° F.	181° F.	183.3°F.	976,980	974,440
Temperature of room	70° F.	77° F.	70.5° F.	77° F.	71.6° F.	77° F.	.....	.....
Friction in pounds	5.27	4.146	2.729	2.427	1.968	1.854	.....	.....

That the physical properties of an alloy vary with the pouring temperature and cooling is evidenced from the physical tests given below, and that remelting when properly done has no deleterious effect. This test was made on an alloy consisting of 87 lead and 13 antimony and remelted 10 times. After each successive melt tests were made. The test was made on virgin metal, metal made from scrap brought up to the required formula, and all scrap.

	ROOM TEMPERATURE				200° F.				
Test No.	Load at Elastic Limit per sq. in.	Ultimate Load per sq. in.	Elong. % in 2 "	Reduction of Area %	Ultimate Load per sq. in.	Elong. % in 2 "	Reduction of Area %	Brinell Hardness Room Temp.	200° F.
1	3,719	7,621	2.6	3.23	4,829	10.7	17.32	20.0	12.7
2	3,859	7,831	3.3	4.35	4,970	8.3	15.72	19.2	13.7
3	4,155	7,653	2.0	3.21	5,243	12.0	20.28	19.6	12.7
4	3,726	6,684	1.6	1.92	4,604	9.3	16.58	18.7	14.9
5	3,327	6,605	1.5	1.69	5,218	9.3	16.84	16.6	13.6
6	3,815	6,812	3.3	2.26	4,999	9.5	16.36	15.40	13.7
7	3,719	7,370	3.3	3.22	4,935	2.7	2.88	17.3	14.1
8	3,756	7,774	4.0	3.73	5,241	9.7	18.93	18.9	13.6
9	3,863	6,744	2.0	3.33	5,279	5.0	7.53	18.0	13.2
10	3,667	6,367	1.5	.91	4,908	12.3	19.72	17.0	12.9
11	3,424	5,728	1.6	1.25	5,364	8.0	13.40	17.7	13.8
12	3,516	7,526	..	..	3,660	20.3	19.62	17.2	11.8
13	4,155	7,653	2.0	3.21	3,717	19.3	26.35	17.5	12.5
14	3,534	7,338	6.3	7.85	4,119	23.7	27.14	16.9	12.7
15	3,420	7,434	11.0	10.47	4,339	21.7	26.07	16.4	12.5
16	3,475	7,718	8.66	9.31	3,902	22.0	26.86	17.3	12.7
17	3,484	7,657	7.0	9.64	4,302	23.0	27.96	17.5	12.3
18	3,714	7,608	8.0	9.11	4,225	22.3	29.36	16.9	12.1
19	3,489	6,979	4.6	5.38	4,228	20.0	24.79	17.6	12.8
20	3,554	7,761	7.6	9.41	4,035	20.7	24.65	17.4	12.0
21	3,340	7,765	6.6	8.52	4,394	13.5	16.97	17.2	12.6
22	3,368	7,570	10.0	9.67	3,819	22.7	30.85	16.4	11.1
23	3,268	7,505	15.0	14.37	3,956	29.3	38.19	16.6	10.8
24	3,257	7,656	7.6	14.08	4,289	20.7	25.56	16.6	11.3
25	3,809	7,992	2.0	1.92	5,231	14.3	17.39	22.6	15.1
26	4,647	9,497	1.0	..	7,113	1.5	1.32	28.5	21.2
27	4,583	6,859	3.22	3.23	5,326	10.7	18.32	18.6	13.7

The above table shows the physical properties of the zinc bearing alloys having the following composition:

9.67 copper
88.08 zinc
2.25 alumin

has 25,000 lbs. per sq. in. ultimate load
1% elongation 2"
126 Brinell hardness

All of the foregoing test pieces were cast in sand, and as will be noticed, physical properties were made at room temperature and at 200° F.

No. 1—Represents all scrap metal.
No. 2 to No. 11, inclusive, scrap calculated to required formula.
No. 12 to No. 21, inclusive, all virgin metal.
No. 22—Lead 88, antimony 12, new metal.
No. 23—Lead 89, antimony 11, new metal.
No. 24—Lead 85, antimony 15, new metal.
No. 25—Lead 85, antimony 10, tin 5, all new metal.
No. 26—Lead 72, antimony 18, tin 10, all new metal.
No. 27—All scrap, using manganese sulphate and charcoal as a flux.

SURFACE COMBUSTION APPLIED TO GALVANIZING

A Cost Comparison Between Coke and Gas Fired Operation

Written for The Metal Industry by Wm. J. Harris, Jr., Engineering Department, The Surface Combustion Company, Long Island City, N. Y.

The use of manufactured gas for heating galvanizing baths seems to have been seldom attempted in the past, and the few installations which have been tried have been unable to meet the competition of coke on a cost basis. The installation which I am about to describe is, therefore, particularly interesting, because of the fact that, in addition to satisfactory operation in every particular, it practically met the cost of the coke fuel, including actual saving in labor.

As is no doubt well known, the usual type of galvanizing bath is a rectangular steel tank of rivetted or welded construction. The dimensions vary, according to the character of work to be done, but may be anywhere from two to four feet in depth by two to six feet wide and five to twenty feet long. Because of the settling of the so-called "dross" to the bottom of the tank, it is impossible to apply heat directly to the bottom. Hence, the usual arrangement is to set the tank on a brick or sand foundation, and to build a brick setting around it with space for a coke fire between the sides of the tank and the inside of the setting. This space may be from six to eighteen inches wide, depending on the amount of heat required, and on two or four sides of the bath, depending on whether it is long and narrow or approximately square in shape.

Fig. 1 shows a coke-fired bath at the plant where the gas installation was made. It is used for coating steel sheets of varying gauges from No. 30 to No. 18 and from 24 in. to 48 in. wide and 6 ft. to 12 ft. long. After "pickling" to remove the scale, the sheets are run through the melted zinc by a "coating machine," consisting of a series of gear-driven steel rollers and a suitable framework immersed in the bath. In coming out of the bath the sheets are carried along an air-cooled conveyer, about one hundred feet long. It will thus be seen that the operation is continuous and that a high rate of work is essential to economical production. The weight of sheets coated varies from 20 to 40 tons per day of 24 hours, using from 6,000 lbs. to 8,000 lbs. of zinc in the same period.

FIG. 1. A COKE-FIRED GALVANIZING TANK. (NOTE THE SMOKE.)

The gas-fired bath is being used for the same kind of work as that just described, and was originally designed for a coke fire. Instead of using a plain brick setting, however, it had been provided with cast iron casings, which were lined with brick and placed about the steel tank after it had been put in position. This more durable construction was designed to make it possible to renew the tank without having to rebuild the brickwork, and it was found particularly well adapted to the installation of the standard "impact type" of Surface Combustion burners. Fig. 2 shows a section of the casing with

burners installed ready for the brickwork, and Fig. 3 shows the same bricked ready to move into place. The casing, as originally made for the coke fire, consisted of four straight sections for the sides and four corner pieces. The side sections, being set closer to the tank for the gas installation, made it necessary to abandon the corner

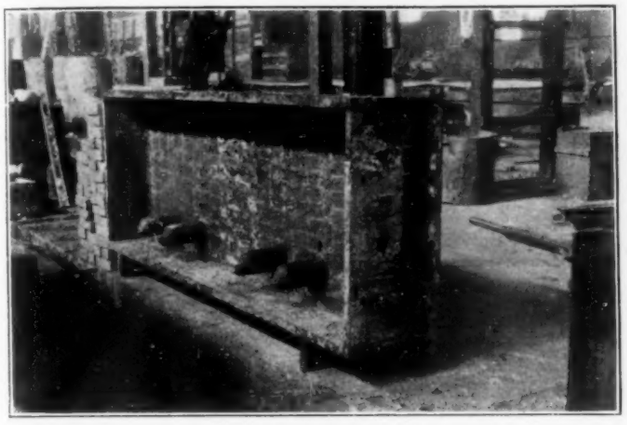


FIG. 2. A SECTION OF THE FURNACE CASING WITH BURNERS INSTALLED.

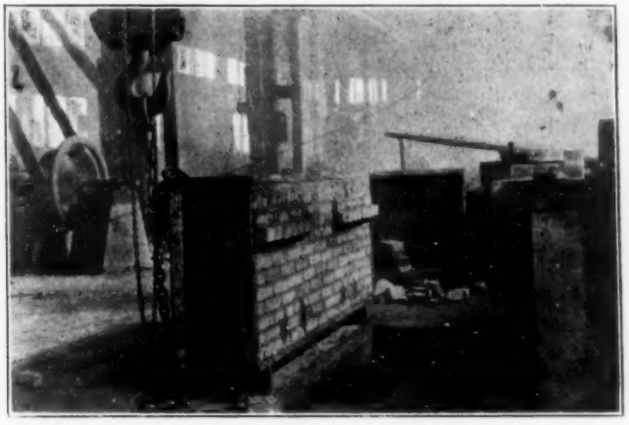


FIG. 3. THE BURNERS BRICKED IN READY TO BE SET IN PLACE.

pieces and fill in the space with brick. This is shown in Fig. 4, which is a view of the completed installation.

The "high pressure" gas system was used. This operates normally on a maximum gas pressure of 10 pounds per square inch and atmospheric air. In this case, however, the gas company was able to supply the gas at 4 pounds pressure. Hence the inspirators were specially designed to operate on 3 pounds at the normal working

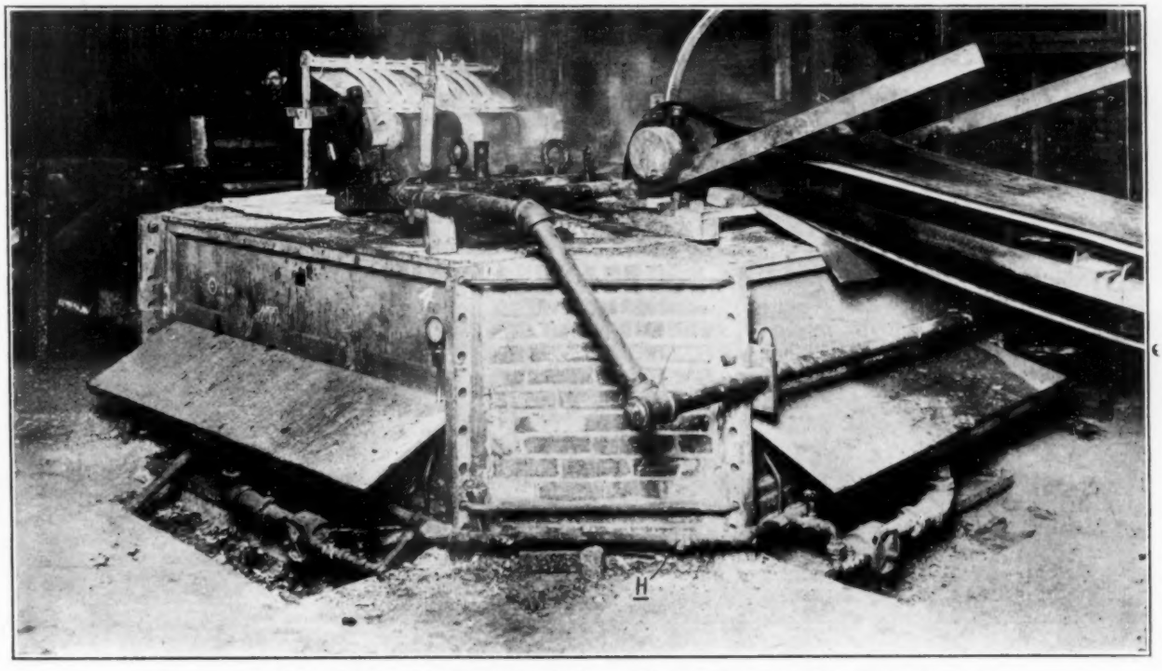


FIG. 4. A GAS FIRED GALVANIZING TANK. (NOTE THE FREEDOM FROM SMOKE.)

rate. A motor-driven gas booster was installed for use should a higher rate be desired and in case the service pressure of the gas should drop. Ordinarily this is not needed, and operating costs are thereby materially reduced. The proportioning of gas and air is entirely automatic without the use of governors or any appliance with moving parts. Temperature control is obtained by the simple adjustment of the gas valve (marked "V" in Fig. 4), and as this is the only valve on the apparatus, it is absolutely a "one-valve" control.

The burners on each of the four sides of the setting are connected to separate inspirators, which are, in turn, connected independently to the high pressure line. The heat on each side of the bath can thus be regulated independently, or any set of burners turned off entirely if desired. A low reading spring pressure gauge (marked "G" in Fig. 4) on each inspirator indicates directly the gas pressure at which it is operating. As the proportioning of the "mixture" is automatic and uniform, this pressure gauge gives an accurate and convenient means of temperature control. Thus, if, say, 2 pounds pressure is found sufficient to maintain the required temperature at a certain rate of work, these conditions can always be duplicated or changed to meet new conditions without "guessing" at what the burners are doing.

The old coke-fired bath (Fig. 1) measures 7 x 7 feet x 44 inches deep with a capacity of 69,000 pounds of zinc, while the gas-fired is 6 x 7 feet x 44 inches deep with a

capacity of 60,000 pounds of zinc. The capacity of steel coated per day is, however, the same, and the fuel consumption was figured on this basis. Coating thirty tons of steel sheets and melting 8,000 pounds of zinc, the coke used was found to be 4,000 pounds per day of 24 hours. The entire time of one man was needed to wheel the coke from the storage bin and fire the furnace. At $5.50 per ton for the coke and 20c per hour for labor, this figures $15.80 per 24 hours. The gas installation was sold on a guarantee that, when doing the same work as above, (30 tons steel and 8,000 pounds of zinc), the gas consumption would not exceed 40,000 feet of 600 B.t.u. gas per 24 hours. At the prevailing rate, this figured $16.40.

On actual test immediately after the installation was completed, 28,000 pounds of steel were coated in twelve hours with 19,000 feet of gas, or at the rate of 28 tons with 38,000 feet per 24 hours. The temperature of the bath was maintained at about 840 degrees F. and new zinc was added at the rate of 6,200 pounds per 24 hours. It was not possible to run at the maximum rate, because sheets of heavy enough gauge to give the required weight were not obtainable. Subsequent reports indicate that the efficiency of the gas fire increases at higher rates of work and that the guarantee has been safely met.

When the bath is not in use, the coating machine is withdrawn and the temperature maintained at about 810 degrees to 820 degrees with 650 cubic feet of gas per hour. Under these conditions, the burners on two sides only are used, and by closing some of the vents in the brickwork, the flue gases are made to circulate around and come out on the sides where the burners are turned off.

It will be noticed that the fuel costs given above are for normal conditions. As a matter of fact, the high-grade foundry coke which is required for this work now costs around $8.00 or $9.00 per ton and is practically unobtainable at that. As a result of these conditions and the very satisfactory results with gas, a second coke bath is to be changed over at the earliest possible moment.

The installation here described was made at the plant of the Chapman Steel Company, Indianapolis, Ind., and is now in daily use. It was designed and installed by The Surface Combustion Company, of Long Island City, N. Y.

STANDARDIZING SUPPLIES

SOME SUGGESTIONS THAT WILL BE FOUND VALUABLE BY THE FOUNDRYMAN AND MANUFACTURER.

WRITTEN FOR THE METAL INDUSTRY BY CHARLES T. BRAGG, CHEMICAL ENGINEER, OHIO BRASS COMPANY.

The reader will, no doubt, call to mind on reading the title of this commentary, how often he has, in moments of retrospection, resolved to "Standardize once and for all" the small supplies used in his foundry.

Possibly nothing is more annoying to the average foundryman, than the constant demand which is being made on him by representatives of various lines of supplies, to change to their products. Of course, every foundry is limited in its consumption of materials, and it is recognized bad practice to use two or three different things for the same purpose.

The supply salesman is often repulsed by the purchasing agent, chemist, or foreman, gently to be sure, but repulsed never the less. There are many times when the supply man feels no worse about the rejection of his line than the man who rejects it. Of course, when price or quality, or both, are given as a reason, rejection is both necessary and fair, but too often little attention is given the smaller necessities of the foundry. This is sometimes caused by the fact that core oil, parting, etc., are considered too small for the attention of the executive and are left to the care of subordinates. They in turn shift about from one thing to another until the executive makes a statement like the one in the first paragraph of this article. The spirit which prompts such a statement is decidedly wrong. It is born of two things; first: desire to get away from continual interviews and suppliers and second, the mad rush for production.

It will be agreed that the larger means of saving or the all important "rapid production," (being more obvious and their accomplishment more dramatic) are more attractive. It will also be agreed that it is easier to make a *large* saving than a *small* one. The investigator always finds that everyone connected with a given institution easily understands his object and cheerfully aids in its accomplishment if it is *large enough*. There are three ways to explain this. First: Everyone likes to participate in an enterprise, the result of which will attract attention. Second: Everyone likes to feel the personal satisfaction attending accomplishment. Third: No one at heart is willing to be wasteful and any proposal to eliminate waste, which he can clearly understand, enlists his sympathy.

The writer holds that the experimental work of the brass foundry is never done. Also, that a satisfied frame of mind, promoted by prosperity, or a neglectful frame of mind promoted by anxiety to "produce" above all things, are equally pernicious and sooner or later will react to a disadvantage.

If the foundryman acquaints himself with the technical requirements of the supplies that he needs and then *standardizes the means of selecting these supplies* he effectually stops annoying sellers, and at the same time gives all who have a meritorious product a chance as well as increases his own fund of knowledge. A great deal is to be learned from a man who has something to sell, that he knows all about and believes in himself.

A good plan is to establish certain times of the year for general overhauling of supply items. At these times give suppliers their opportunity to send samples. Select the most suitable, price, peculiar requirements, etc., considered, and contract to the next period. Suppliers soon learn to respect this method, which is successfully in use in some of our large foundries. The supplier gets his chance, the foundry man gets the general information and the net result is that the best product is obtained on a basis that is fair beyond dispute and the most productive for all concerned.

Not the least to be considered is the effect of a policy of this kind in the buyer's own plant. Systematic testing of a group of competitive supplies, even though done under laboratory direction must be partly performed in the foundry. This draws the attention of all concerned, periodically, to a material which through daily association loses its value in the employe's mind. The result is that, once seeing that even the small things occupy a pigeon hole in the company's mind, the vigilance and care of even the casual employe is increased.

BRITISH PROHIBITION ON IMPORTATION OF JEWELRY.

[From American Vice Consul, London, No. 17.]

The importation of jewelry and all manufactures of gold and silver other than watches and watchcases is now prohibited except under license.

THE UNIQUE BRASS FOUNDRY COMPANY

BUFFALO'S LATEST AND MOST UP-TO-DATE BRASS FOUNDRY.

WRITTEN FOR THE METAL INDUSTRY BY GEORGE W. GRUPP.

In 1904 four practical foundrymen got together and organized the Unique Metal Company. At 18 Elk street they set up a very small jobbing foundry. Here these four men plodded along until 1907 and then failed. William Stewart who had just finished a course in metallurgy in the Manchester Technical School of Manchester, England, happened to be in Buffalo at the time. Buffalo impressed him as a city which had a great future and so he decided to settle down in Buffalo and put his technical learning to some practical use. Upon learning that the Unique Metal Company had failed, he at once set out to buy the remaining fragments of that company. After having bought this equipment he next had to find suitable quarters for his first real business adventure in the stream of life which he called the Unique Brass Foundry Company. The old quarters of the Unique did not suit him. They were too small to suit his particular fancy. After much searching he finally negotiated to lease the major portion of a building at 25 Illinois street. This building was six times too large for his immediate demands, but Stewart cared little about that. He had confidence in himself and in the foundry business. It was hard sleighing at first and very often he was compelled to labor with the few men he then employed. But with his dogged persistence and confidence and keen business sense he soon began to succeed, until last summer his business had begun to outgrow the size of the foundry. Thus he was compelled to build a foundry of his own, which was completed

FIG. 1. AN EXTERIOR VIEW OF THE UNIQUE BRASS FOUNDRY COMPANY, BUFFALO, N. Y.

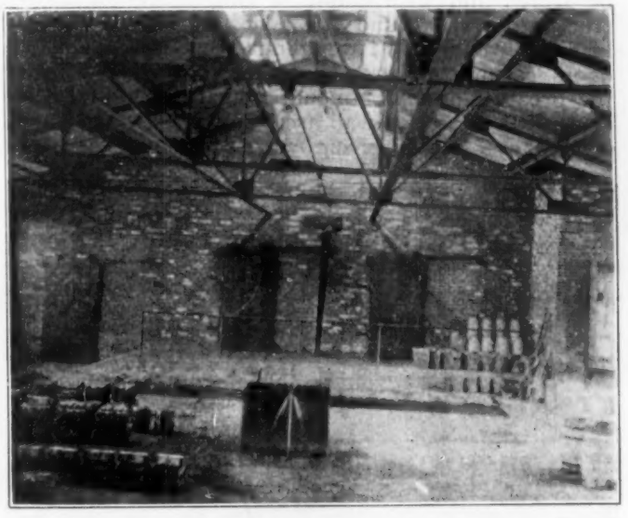


FIG. 3. A SECTIONAL VIEW OF THE FOUNDRY, LOOKING TOWARD THE FURNACES, COKE AND SAND BINS, ETC. UNIQUE BRASS FOUNDRY CO., BUFFALO, N. Y.

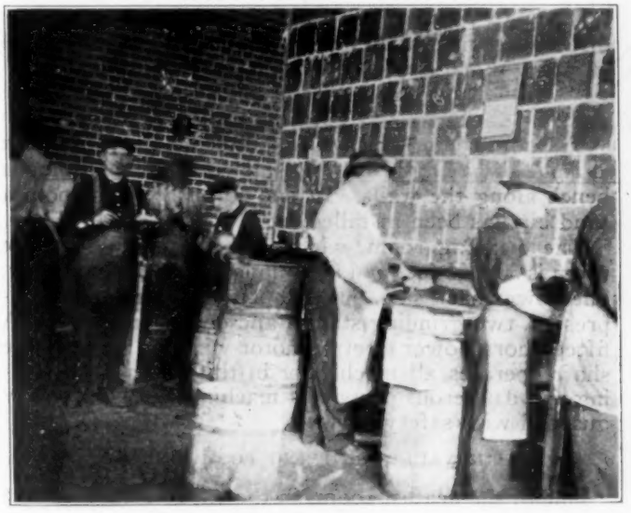


FIG. 2. MEN AT WORK IN THE CORE ROOM. UNIQUE BRASS FOUNDRY CO., BUFFALO, N. Y.

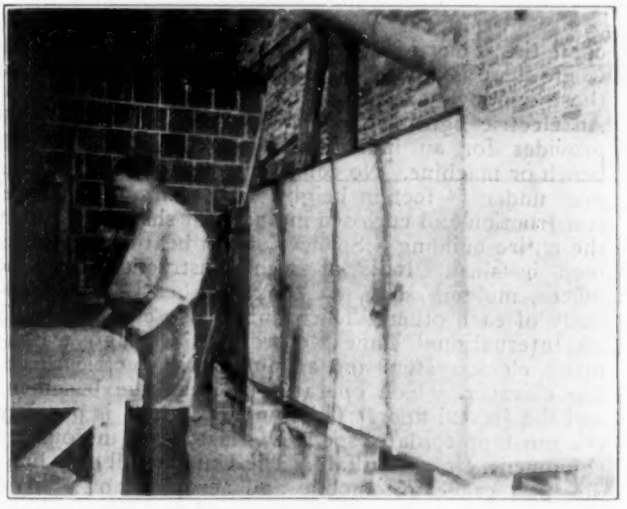


FIG. 4. A VIEW OF THE CORE OVENS. UNIQUE BRASS FOUNDRY CO., BUFFALO, N. Y.

May 1, 1916, to meet his present volume of business.

The new foundry of the Unique Brass Foundry Company is housed in an "L" shaped steel and brick structure 85 x 136 feet. It is 2/3 one story, which is entirely fireproof, and 1/3 two stories, which is semi-fireproof. The site upon which the foundry is situated is located in an ideal section of the North side of the city and adjacent to the New York Central Railroad tracks. Leading to the plant, itself, there is a private switch of some 400 feet. All coke and sand may be unloaded directly from freight car to foundry bins. The plant is equipped with a fine large yard where old cores may be stored and with ample driving space for motor trucks to turn around etc., when backing up to the loading platform. Throughout this new plant all doors, casings and sash are made of steel. To insure the greatest possible amount of natural light 85 per cent. of the exterior wall area is of glass. This large percentage of space given over to windows has overcome the defect of dark spots which are so often seen where there is a large floor area. About 33 per cent. of these windows are provided with pivoted ventilators. An electric lighting system has been installed which provides for an individual nitrogen light for each bench or machine. No ceiling throughout the plant is ever under 14 feet in height. All stairs are of steel construction and enclosed in fireproof shafts. To heat the entire building a Spencer steam heating plant has been installed. It is of such construction that the offices, molding shop, etc., may be heated independently of each other. The plant is also equipped with an International Time Recorder, a Chicago watchman's clock system and an automatic electric three-ton elevator, which operates between the basement and the second floor. This foundry, which is possibly the most up-to-date, spells the last word in foundry equipment, etc., in Buffalo. The Unique will only handle high grade automobile and aeroplane or artistic casting work in bronze, yellow and red brass, aluminum, manganese and white metal. The plant was designed by Edwin C. Haase and erected under the supervision of Mr. Haase and Mr. Stewart. The site, building and equipment cost $45,000.

FIG. 5. A SECTIONAL VIEW OF THE FIRE PROOF PATTERN VAULT OF THE UNIQUE BRASS FOUNDRY COMPANY, BUFFALO, N. Y.

FIG. 6. A SECTIONAL VIEW OF THE CLEANING ROOM. UNIQUE BRASS FOUNDRY COMPANY, BUFFALO, N. Y.

MOLDING SHOP

The molding room, which is 50 x 84 feet, inside measurement, is covered with a trussed hip roof. The metal roofing, which was used, is covered with a special protective coating. The Monitor, which runs the full length of the room, creates a draft sufficiently great to carry off all gaseous fumes which prevail in foundries. The room is equipped with a battery of twelve coke furnaces, which have a daily capacity of 10,000 pounds. An unusually fine natural draft to the furnaces has been made possible by a 77-foot steel stack. Twenty-two molding benches equipped with compressed air blowers are lined up along the walls of the molding room. A crane of 800 pounds capacity has been installed directly over the furnaces in order that in lifting the pots from the furnaces the men might have it a bit more easy. The three core ovens which are located at the other end of the room are sufficiently large to keep fifteen coremakers busy. Two electric riddles are to be installed in the molding room. The floor of the foundry is made of paving brick. Just directly off from the molding room is a sand and coke storage. Each bin has a capacity of two carloads.

CORE AND CLEANING ROOM

The core room, which is 22 x 30 feet and whose floor is made of paving brick, is equipped with a continuous bench along the walls. In one corner of this room a sand bin has been installed.

The cleaning room, which is adjacent to the core room is 30 x 16 feet and is equipped with one band saw, one power hack saw, one 130 pound capacity air compressor, two grinding stands, and one sprue cutter. A fifteen horsepower electric motor with the aid of a line shaft operates all machinery in this room. All belting and dangerous parts of a machine will be properly guarded with safety devices.

PATTERN VAULT, SHIPPING ROOM AND OFFICES

One of the neatest rooms in the entire establishment is the fireproof pattern vault which is 15 foot square. Here all patterns are filed and labeled by a shipping clerk. Each pattern as it leaves the molding room is labeled with a tag and then indexed. All patterns rest on steel shelving which is of such construction that additional shelving may be added at will. At present there is 200 feet of shelving in the vault.

THE MANUFACTURE OF BRONZE POWDER

AN ILLUSTRATED DESCRIPTION OF ITS PRODUCTION IN GERMANY AND ITS INDUSTRIAL USES

WRITTEN FOR THE METAL INDUSTRY BY OTTO VON-SCHLENK.

(Continued from February.)

By the second method the aluminum is fused in graphite muffles in quantities of about 20 to 25 lb., for which about 15 to 25 minutes is required. The contents of the muffle are then poured over a sieve of refractory material which is fixed on top of a barrel containing about 250 litres of cold water. The sieve generally consists of a muffle with a perforated bottom. Gently tapping the sieve facilitates the formation of drops of aluminum, the latter solidifying immediately on coming into contact with the cold water. Alternatively the metal can be poured in a fine spray into the water, in which case the water must constantly be stirred. In both cases the water in the barrel must be renewed frequently, and great care must be taken to avoid undue overheating of the water.

It must be pointed out that in producing granulated

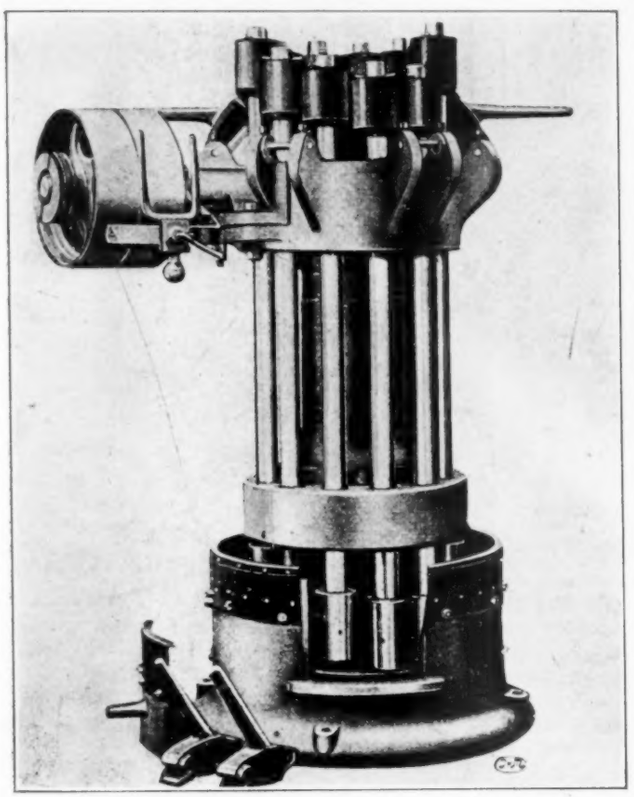


FIG. 2. HEAVY STAMP FOR BRASS, BRONZE, COPPER AND ALLOYS.

aluminum by this second method great care must be taken to avoid accidents. In 1911 a heavy explosion occurred in some foreign works producing aluminum powder in this way. A commission was appointed to inquire into the cause of this and similar accidents. This commission was of the opinion that the cause of the explosion could only be found in sudden excessive formation of steam. As is well known, the specific heat of aluminum is very high indeed, so that if the quantity of liquid aluminum poured into the water is large compared to the quantity of water, and more especially if the latter is already hot, enormous quantities of steam can be produced, causing violent explosions. As mentioned above, it is advisable to tap the sieve gently in order to facilitate the formation of drops and in order to make the liquid metal pass through the sieve quicker. The workmen should, however, be warned that in the case of a sieve consisting of graphite this tapping must be very gentle indeed. A wooden mallet should be used, but on no account an iron hammer. If by excessive tapping the graphite sieve is cracked the metal will suddenly pour into the water and may produce an explosion. The graphite sieve should, therefore, always be examined carefully before it is used. Great care must also be taken to have the graphite sieve perfectly dry before using it, otherwise the first metal poured on it may cause the dampness to evaporate too suddenly and thus crack the sieve. Finally, it may be mentioned that the water should on no account be alkaline, as such water would be dissociated at a temperature of about 660°C., and may thus cause a gas explosion.

Summarizing, we have seen that the various metals can be used for making bronze powders in the following shapes:

(1) As leaf metals.—This is the most expensive raw

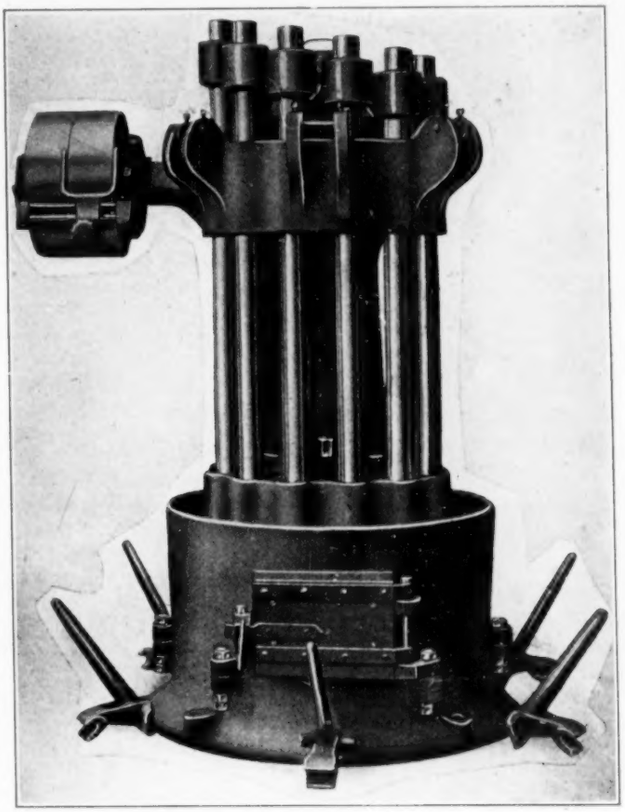


FIG. 3. HEAVY STAMP FOR BRASS, BRONZE AND COPPER ALLOYS.

material, and only the trimming and other scrap is used nowadays, except for the very finest qualities of powders, for which this material is still used.

(2) In the shape of foil.—This, too, is an expensive method. In the manufacture of foil, however, large

quantities of scrap become available, and these form a very important raw material for fine powders.

(3) In the shape of cast strips, flakes and granulated material. The latter material is very suitable, as will be shown later on.

(4) Sheet metal up to about ⅛ in. thickness.—For this purpose, of course, sheet scrap only is used. This forms the bulk of the available material for the manufacture of all except the finest sorts of powder.

The different raw materials require different treatment, as will be shown subsequently when discussing the various methods of manufacture.

In the manufacture of powders we have to distinguish the following five processes: (1) Stamping. (2) Grading. (3) Grinding. (4) Polishing. (5) Coloring.

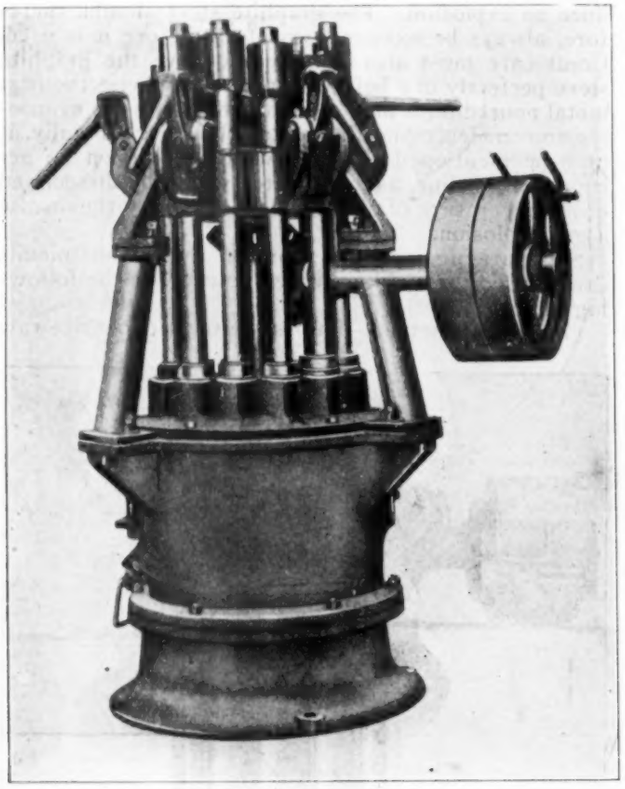


FIG. 4.—MEDIUM STAMP FOR BRASS, BRONZE COPPER AND ALLOYS.

We shall in the next chapter discuss these processes and the machinery used.

STAMPING.

The actual disintegration—*i.e.*, the breaking up of the sheets, foil, or leaf into fine powder—is done in stamping batteries. These are very similar in design to the stamping batteries used in gold mining. They consist of a number of "pots" or "kettles" in which "rammers" or "dies" are fitted by cams and then suddenly dropped. The kettles are filled with the metal to be powdered. The rammers do not only move up and down, but are also made to spin round their own axis. Their action is, therefore, twofold; the metal pieces are flattened by the weight of the dropping rammer, and are also broken up into smaller pieces.

A moment's consideration will make it clear that it is not possible to perform the whole process of breaking up the material from comparatively thick particles into the finest powder. Supposing the raw material consists of sheet metal—say, 1-16th in. thickness. To break such sheet up into flakes of, say, 1-100th in. thickness the rammer would have to be very heavy, the drop would have to be large, and the actual working surface rather small; in short, the specific pressure acting upon the material to be stamped must be very great. Such a stamping battery would, however, be entirely unsuitable for stamping fine flakes into powder. The high specific pressure acting on the mass of fine flakes would cause an amalgamation of the small particles, which would be favored also by the comparatively high temperature caused by the high specific pressure; so that instead of being transformed into fine powder, the whole mass would aggregate into a number of lumps or cakes, absolutely useless for the purpose. Once a solid cake has been formed, the structure of the metal has been changed so as to make it quite unsuitable for powdering purposes.

The tendency of the metal to cake together as it is

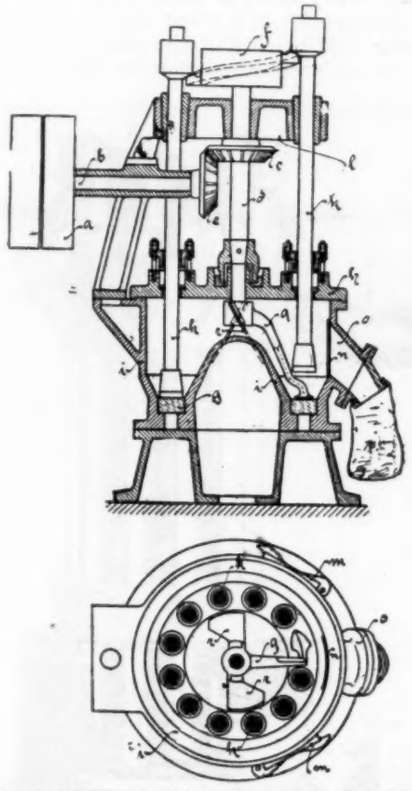


FIG. 5.—MEDIUM STAMP SECTION AND PLAN.

stamped finer is always a source of great trouble, unless steps are taken to prevent it. The matter will be discussed later on.

It has been shown that to stamp metal from a coarse piece into finer powder several different stamps are required. As the process goes on the specific pressure has to be reduced; the rammers must become lighter, the drop less, and the working surface larger.

FIG. 3

In present practice three different kinds of batteries are employed: Heavy, medium, and light stamps.

Fig. 2 illustrates a heavy stamp used for brass, bronze, copper, etc.; in fact, all metals except aluminum.

This machine will break up cast flakes, sheet scrap up to ⅛ in. thickness, rough borings, etc. It consists of one open trough, in which are arranged twelve

rammers. The powder is transmitted from the belt-pulleys through the short horizontal shaft and a bevel gear to the (main) vertical shaft, on the upper end of which are arranged helical cams; by these cams the tappets on the rammers are lifted. During every revolution of the vertical shaft each of the twelve cams is lifted and dropped once; hence the number of blows performed by each rammer is equal to the number of revolutions of the main shaft. For each rammer one lifting arm is provided to keep the rammer up (out of gear) if required. A door is provided to charge the machine with raw material and to remove it again when broken up sufficiently.

It will be noticed that in this machine the trough is not covered. The metal is broken down to pieces about ¼ in. to ½ in. in diameter, so there is no danger of the particles being thrown out.

Fig. 3 shows a similar machine, more powerfully built, suitable for somewhat harder metals and alloys.

The medium stamp used for the next stage—*i.e.*, for breaking up the small flakes into so-called "flitter" or "brocade"—is shown in Figs. 4 and 5.

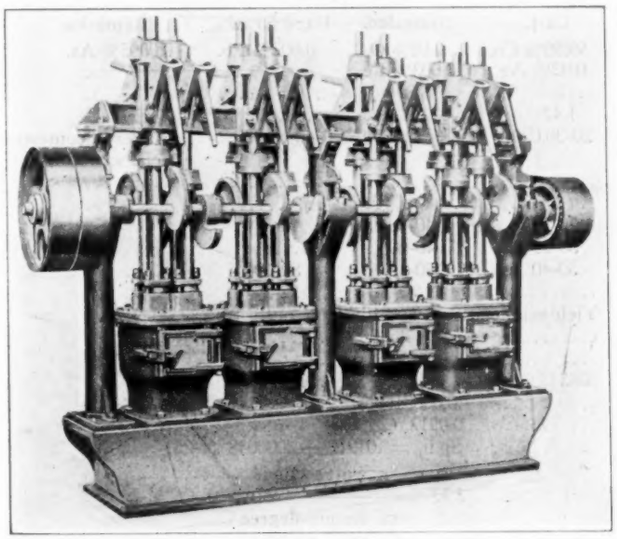


FIG. 6—LIGHT STAMP, SUITABLE FOR CRUSHING ALL METALS AND ALLOYS.

Fig. 5 is a cross-section through the machine, with the plan enlarged so as to show the stirring device. It will be noted that the working chamber of this machine is enclosed in order to prevent an escape of the fine particles. *(a)* is the fast pulley, *(b)* the horizontal shaft, *(c)* the bevel gear driving the vertical shaft *(d)*. Both this shaft and all rammers run in stuffing-boxes to prevent any escape of the finer metal particles. *(f)* Is the helical cam for lifting the tappets (and rammers *k*), *m, m* are two doors for charging and emptying respectively.

In this type of stamping battery the metal is reduced to a state that is generally termed "flitter" or "brocade." These particles are already very thin, and on an average about 1-24th and 1-32nd inch long and wide. At the same time, part of the stamped material will already be reduced to actual powder. If this powder was left in the battery to be stamped over and over again it would deteriorate in quality. To avoid this a special device is provided. *O* is a short pipe connected with the main body of the trough or kettle. It is separated from the latter by a very fine wire gauze *(n)*, and on its end is fixed a leather bag *(p)*. On the main shaft *(d)* is fixed a combined fan and stirring device *(r, r, q)*. The stirring device serves the purpose of keeping the material in constant movement; the finer particles are thrown upwards, and finally, by the action of the fans *(r, r)*, they are thrown towards the wire gauze *(n)*, and thus are collected in the leather bag shown at *p*.

The most important of the stamps—the light stamp—is shown in Fig. 6. On the proper design and proportions of this machine depends the success of the whole process. This machine is very solidly built. Each pot or kettle contains four rammers, which are running in stuffing boxes. They are provided with a tight-fitting door that serves for charging and emptying the pot; the door is made to close the stamping space hermetically, in order to prevent the escape of even the finest powder. At the back of each door a leather bag is provided with an aperture closed by wire gauze, through which the fine powder settles into the bag. The cams lift and drop the rammers alternately—at the same time imparting to them a spinning movement, which causes them to revolve round the axis once or twice during their fall.

The position of the cams is selected so that the rammers in each pot drop in uniform succession, causing the material to be stamped to move continually in one direction. Thus the whole powder is continually stirred round and mixed thoroughly, and uniformly crushed.

While the heavy and medium stamps already described are suitable for crushing brass, bronze, copper and alloys only, the light stamp is suitable for all metals, including aluminum.

(To be continued.)

THE ALUMINUM RESOURCES OF THE CENTRAL POWERS.

Aluminum can only be produced on commercial lines by the prodigious expenditure of power turned into electrical energy, and such power is only available at a low figure by harnessing the natural resources of water power. As far as we are aware there were but two aluminum works in existence in the territory of the Central Powers before the war—one in Austria and one in Germany. The principal supplies of bauxite before the war came from the south of France, from where most of the European aluminum works, including Great Britain, drew their supplies; the latter, however, augments her supplies from Larne, in Ireland.

Germany, as well as Austria, has, it is true, indigenous bauxite resources which were exploited formerly, but were obviously abandoned on account of their inferiority to those of France; but now they are once more dependent upon their own resources, to which they have vigorously resorted again.

The principal German bauxite supply is drawn from the Vogelsberg, a small range of mountains, and the most important working is known as the "Hessen," exploited by a firm at Honau. The bauxite of this range is the product of decomposition of basalt rock.

The Austrian bauxite is found pretty generally distributed over the Eastern Alps, where "Wocheinit" is principally worked, in the neighborhood of Laibach. "Wocheinit" is a lower grade of a clayey bauxite which reaches a thickness of several yards in the neighborhood of the Wochein Lake. The Austrian aluminum works are at Lent-Gastein, in Styris, and those on German territory at Rheinfelden, near Basle.

As to the annual capacity of these two works, if we base our calculations on pre-war conditions, the available water power in the two establishments is approximately 30,000 h.-p. together, and if the whole of this is now devoted to the production of aluminum—which it was not before the war—the maximum output of the two works would be about 4,000 tons per annum.

PROPERTIES OF METALS AND ALLOYS

DATA SHEET OF THE BUREAU OF STANDARDS BEING DISTRIBUTED FOR THE COLLECTION OF INFORMATION CONCERNING METALS AND ALLOYS

The Bureau of Standards, Washington, D. C., by the Director, S. W. Stratton, has issued a data sheet on the "Properties of Metals and Alloys" to engineers and manufacturers in order to obtain all the available data relating to the properties of metals and alloys. The data sheet, which is given below, serves to illustrate the class of information that the bureau desires to obtain and it is stated that what is desired is the numerical values that are considered representative of and fair to the material described for technical practice rather than for special values and the following directions are given as an aid to anyone who is interested in filling out and completing the tables of information for the various metals and alloys required by the bureau. Blanks for filling out may be obtained from the bureau.

Name of metal or alloy	Commercial electrolytic copper.			
State or condition	Cast.	Annealed.	Hard Drawn.	Remarks.
Chemical composition and impurities	99.90% Cu. 0.02% Ag.	0.08% O_2. 0.003% Fe.	0.002% Pb.	0.0005% As. .....
Density, g. per $cm.^3$	.....	8.89	.....	.....
Shrinkage coefficient, per cent	1.42	.....	.....	.....
Tensile strength, lbs. per sq. in	20-30,000	30-40,000	40-60,000	Ranges of commercial variations.
Yield point, lbs. per sq. in	.....	.....	.....	.....
Elastic limit, lbs. per sq. in	.....	.....	.....	.....
Elongation in 2 inches, per cent	30-50	40-60	4-5	.....
Reduction of area, per cent	30-50	40-60	.....	.....
Brinell hardness, H. N	30-40	30-40	80-100	.....
Scleroscope hardness	.....	6-7	22-24	.....
Behavior in compression	Yields indefinitely and flattens out.			
Frictional coefficient (steel)	.....	.....	.....	.....
Abrasion resistance	.....	.....	.....	.....
Melting range, °C. or °F	1083.0°C.	.....	.....	.....
Coefficient of expansion, per °C	.....	0.00001666	.....	.....
Specific heat	.....	0.0917 (25°C.)		
Cal. per g. degree	.....	Sp.h. $= .01917 + .000048\ (t-25)$		
Thermal conductivity	.....	$3.73\ \left(\frac{\text{watt seconds}}{\text{cm.-second-degree C.}}\right)$		
Electrical conductivity, ohms (meter, gram)	30-90%	100% = 0.15328	96-97%	
Temperature resistance coefficient per degree C	.....	0.0000393	.....	.....
Resistance to corrosion	.....	.....	.....	.....
Hydraulic properties	.....	.....	.....	.....
Optical properties	Emissivity for $\lambda = .65\ \omega$	for liquid (1100°C.) = .150; for solid (1080°C.) = .117		
Miscellaneous (including any other known property)	.....	.....	.....	.....

DATA SHEET FOR METALS AND ALLOYS NOW BEING DISTRIBUTED BY THE BUREAU OF STANDARDS, WASHINGTON, D. C.

"The following should be borne in mind in filling in and completing the table:

"1. Chemical composition should be known to apply strictly to alloy for which properties are given.

"2. The state of the metal as cast, annealed, forged, rolled, etc., should be given in as great detail as possible.

"3. The authority or source for all numerical values should be given.

"4. The limits or tolerances which should be allowed or expected in practice for any constant should be given. These may be indicated on line immediately below best value or values.

"5. Where maximum values only occur they may be prefixed by *a*, minimum values only by *b*.

"6. When not self evident, the unit should be given in which a constant is expressed. Size and description of test pieces should be given.

"7. When possible and known, the variation with temperature of any property should also be given.

"8. Data on the effect of impurities on any of the physical properties of any metal or alloy will be greatly appreciated.

"9. Additional forms will be furnished as desired.

"10. As illustrative of what is wanted a sheet giving the properties of copper is shown above. Criticisms of the constants for copper are desired.

"11. Some of the alloys for which data are desired are the following: Aluminum and its light alloys with zinc, copper, etc., of stated percentages; nickel, Monel metal, and copper-nickel alloys; aluminum bronzes, such as Al 7—Cu 93, Al 10—Cu 90, etc.; manganese bronzes, cast and wrought; phosphor-bronzes, such as Cu 80, Sn 12, Pb 7, P 1, etc.; Muntz metal, naval brass, Tobin bronze, and brass of 60 Cu—40 Zn; yellow brass of 70 Cu—30 Zn, the red brasses and other brasses; bronzes of 90 Cu—10 Sn, 88 Cu—10 Sn—2 Zn, 88 Cu—8 Sn—4 Zn, and their modifications with Pb and Fe added, etc.; bearing metals; white metals, etc.

"12. Similar data that you can furnish on any other metals or alloys will be greatly appreciated."

CANADA'S NICKEL EXPORT.

Canada's exports of nickel in the fiscal year ended March 31, 1916, amounted to 70,543,000 pounds, valued at $7,714,769. Of the total 11,610,000 pounds, valued at $1,779,801, went to Great Britain and 58,832,000 pounds, valued at $5,934,969, to the United States.

THE BRASS CHEMIST

How His Usefulness Is Explained by the Scovill Bulletin of the Scovill Manufacturing Company, Waterbury, Conn.

The work of the Chemistry and Test Department has a very important connection with the maintenance of the Scovill Standard of workmanship and material. At the present time the laboratory force consists of twenty-seven and more will be required when the new laboratory building is completed.

No one person has done as much to stamp out rule-of-thumb methods as the chemist in an industry such as ours. Guess-work is daily receiving a death blow. No longer can we be sold any gold bricks. Seldom do we remain long in the dark as to the cause of defects in material.

The earliest duty of the brass chemist was analysis, the finding out of the proportions of copper, zinc and lead in specimens of brass. Of such analysis about 300 a day are made.

Not less important are analyses made to test the purity of purchased raw material; such include copper, zinc, nickel, coal, steel, oils, acids, greases, etc., etc.

So far, the work described has to do with the study of the qualities of purchased and cast brass. But the next step was to specify to the dealer just what qualities we wanted, and expected him to fulfil in his delivered goods. This avoided all doubt and assured the Scoviil Company of first rate supplies.

The chemist did not stop there, however, but immediately applied himself to controlling and increasing the efficiency of the use of all supplies. Accordingly we find him looking out for the waste of acid in the dip and plating room, and in all pickle-tubs throughout the plant —too much acid is as bad as too little acid and either condition results in a loss of time, just as serious as the acid loss.

Next we find him working away at the high cost of certain supplies—can a substitute be found nearly as effective and much cheaper? Can the same thing be compounded right here in the plant for less money? Sometimes no—many times yes.

His training in the taking of accurate measurements comes in very handy, too. Who is it who tests and readjusts the pyrometers, thermometers, and other delicate recording instruments about the factory? This work is one of the duties of the Chemistry and Test Department.

The art of chemistry does not tell all about a material—the chemical analysis can be exactly the same for two pieces of metal which differ in many respects. Thus we find in the laboratory, instruments for testing the hardness and the strength of metals, likewise microscopes and delicate cameras for observing and recording the appearance of highly magnified portions of the surface of metals in order to show their structure.

THE NEW CHEMICAL LABORATORY OF THE SCOVILL MANUFACTURING COMPANY, WATERBURY, CONN.

Suppose a customer writes in that some sheet brass supplied him by our mill is very poor, says he cannot do anything with it as it breaks in his press tools. We write him to send us a piece of work showing the trouble and we submit it to our chemist.

Analysis shows the mixture to be correct, tensile strength and hardness tests are gratifying, but an examination under the microscope shows that he is abusing the metal, asking it to do too much, especially unless his tools are kept in good condition. Moreover, as a further proof of the quality of the brass we take a piece out of the same shell returned by customer and draw it into a deep shell, convincing him that his tools were wrong.

BIG INCREASE IN ALUMINUM.

The domestic consumption of aluminum in 1916, according to estimates made by J. M. Hill, of the U. S. Geological Survey, of the Department of the Interior, was over 121,000,000 pounds. The estimates are based on statistics of the domestic production for the year and of the imports for 9 months. This is an increase of more than 21 per cent over the consumption of 1915.

EDITORIAL

Vol. 15 NEW YORK, APRIL 1917 No. 4

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS.
Published Monthly

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE $1.00 PER YEAR, POSTPAID TO ANY PART OF THE WORLD. :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order : Cash Should Be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon - - - - - - - - - Editor and Publisher
Louis J. Krom - - - - - - - - - - - Managing Editor
George W. Cooper - - - - - - - - - Advertising Manager
Thomas A. Trumbour - - - - - - - - Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK.
Telephone Number John 689. Cable Address, Metalustry

CONTENTS

WAR AND METALS

Since our last issue there has been considerable progress made in the direction of preparedness. Great patriotic meetings have been held all over the country and thousands of persons have signed pledges of loyalty and support to the administration. This is all as it should be, but something more is needed. The movement for preparedness has been characterized in some quarters, and to a surprising extent, as having been prompted and aided by a desire on the part of munition manufacturers to obtain for themselves undue profits in the sale of war materials. To offset this feeling we have the recent offer on the part of the principal copper producers to supply the United States with forty-five million pounds of copper at less than one-half the present market price. This is a most admirable move on the part of the copper producers and this action is now followed by the announcement that more than 5,000 industrial concerns in the United States have offered their services to the government in time of war.

Almost every commodity which would be required for maintenance of the army and the navy, these departments announce, can now be obtained in virtually unlimited quantities at near cost, or at a fair profit to the seller.

The war and navy departments highly commend the almost universal response of American firms to the threat of war, and the "self-sacrificing attitude" of the industries of the nation.

Some of the concerns have offered to produce at actual cost; others have offered to place their plants at the disposal of the government for whatever use may be required of them, and still others have named moderate profit arrangements whereby they may serve the Government and still keep corporate interests intact.

"The American Iron and Steel Institute has done a great deal to bring about more cordial relations between the iron and steel manufacturers," says THE IRON AGE, but we have not noticed much concerted effort in this connection among the brass manufacturers and we believe that there is a large field for the American Institute of Metals to work in to bring about such results and let the country know where they stand.

Whether Congress declares war outright or that a state of war exists, it is a fact that the United States is being warred against every day and it is war that is relentless against men, women, children, relief and hospital ships alike. It is war of the most cruel type that knows no modification and it is time that the United States of America puts its house in order. This is being done in

some parts of the country and it is noteworthy that Connecticut, the largest brass producing state, has taken the lead. Under the direction and at the suggestion of Governor Marcus H. Holcomb, a most remarkable census of the men of the state above the age of sixteen has been taken. In arranging for this census Governor Holcomb first recommended in his message to a special joint session of the legislature his idea of the census and its need. The General Assembly responded at once and gave the Governor the power to proceed as he wished, to call upon all public officials for any aid whatever and to draw upon the state treasury for any expenses incurred. The story of how this great work was done WITHOUT COST to the state is so well told by the SCIENTIFIC AMERICAN that we quote it here:

> "Prominent citizens abandoned their business and gave sixteen hours a day to the organization and supervision of the local enumeration and the central bureau. In two weeks 10,000 agents were commissioned. The great insurance companies of Hartford unanimously and without reserve put all their resources of machines and skilled operators at the disposal of the bureau, and one of them gave it quarters. Girls from home and school, even married women, flocked to these quarters to volunteer for the many tasks demanding unskilled workers; and scores of girls went daily from a hard day's work to spend the evening in the bureau's office. All this makes possible the broad statement that not one cent has been spent for labor; this has been a census of the people of the state, by the people and for the people."

Thus the brass state has set an excellent example which we hope to see followed by all the rest. They will then know as Connecticut does today just where they will stand if war finally comes.

EDITORIAL CONFERENCE

As one of the direct results of the efforts of the Editorial Conference of the New York Business Publishers' Association, Inc., the address of O. P. AUSTIN before a recent meeting of the conference is a shining light. This address, which is published more or less in full in this issue of THE METAL INDUSTRY, furnishes a most interesting opinion as to international trade relations after the war. Placed as he is, the statistician of the National City Bank of New York, one of our largest and most powerful financial institutions, MR. AUSTIN has excellent facilities for formulating his opinions and drawing his conclusions. We believe this address is worthy of the most careful study and we commend it to those of our readers, and they are many, who are interested in, or will be, international trade.

This address by the way is only one of the successes already achieved by the Editorial Conference and we expect to be able to place before our readers from time to time just such concrete examples of editorial co-operation as this address represents. The Editorial Conference is the outgrowth of the appointment by the New York Business Publishers' Association of a committee of editors composed of all of the managing editors of the business papers in New York City. The object of the conference is to further the general interests of the business press and consequently of the advertisers and readers.

Among the things that the Conference has in mind for its immediate consideration are such work as co-operating with the Bureau of Foreign and Domestic Commerce; considering the question of railway car shortage; consideration of the Webb bill; co-operation with the National Association of Commerce, Washington, D. C., and the bettering of United States of America's trade relations with foreign countries. Judging from what has already been done by this Conference while yet in its formative stage we may look for tangible results in the shape of an increase in the influence of the business press in matters of common interest.

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

BORONIZED "PRODUCTS"

TO THE EDITOR OF THE METAL INDUSTRY:

Better go light on advertising that "Boronized copper"; there "aint no such thing" as "Boronized copper." "It can't be did." Ask Dr. E. Weintraub what he thinks of "Boronized copper." Ask the Bureau of Standards at Washington, D. C., what it thinks of the stuff. Ask yourself, if a treatment of a metal with fluorspar and boracic acid will introduce any boron into copper so that the boron may be detected by any method of analysis, for that is the method Mr. Scott* claims is used to make the so-called "Boronized copper." "VERITAS."

TO THE EDITOR OF THE METAL INDUSTRY:

In answer to yours of March 17 I shall give you a few facts from which you may derive your own conclusions.

(1) I had the "Boron copper" analyzed, but found no boron.

(2) I have tried it as a deoxidizer for copper, but found no improvement.

(3) In their advertisements the American Boron Products Company use X-ray pictures of copper deoxidized by "Boroflux," a material invented by me and exploited by the General Electric Company, and which has nothing to do with "Boron copper."

(4) The same remark applies to their quotation of the work of Ruder, who used "Boroflux," and not at all Boron copper.

(5) Many of the statements contained in their advertisements are unscientific; such, for instance, as the statement that boron occurs in "Boron copper" as a gas, and yet forms crystals.

(6) The *universal* applicability of "Boron copper" as a flux is to me a scientific impossibility. E. WEINTRAUB.

CAMBRIDGE, Mass., March 26, 1917.

[The first of the letters published above came entirely unsolicited. Prior to its receipt, however, THE METAL INDUSTRY had received several intimations that the boron products were not proving to be all that was claimed for them. Acting on these reports and desirous of getting at the truth, inquiries were made of prominent metal men with the idea of getting their opinions. Dr. Weintraub so far is the only one who has furnished such an opinion and we publish

*THE METAL INDUSTRY, March, 1917.

his letter with the view of inviting some expression from others who have used these products.

Being impelled with a desire, as is consistent with the policy of THE METAL INDUSTRY to be absolutely impartial to the criticised as well as the critics, the letters were submitted to the manufacturer of boron or boronized products. He was asked to furnish an answer that could be published simultaneously with the letters of the critics. The manufacturer called at the office of THE METAL INDUSTRY, discussed the situation and submitted evidence of the merits of his products. He signified his intention of writing a reply and asked for time in which to prepare it; which request was of course readily granted. Now, as we are about to go to press, he announces that no answer to the letters of the critics can be made at this time. Due to the lack of time allowed and because he is so busy attending to the wants of his customers he states that he is unable to make any reply until our next issue. As honest and dispassionate discussion is beneficial alike to manufacturer and consumer THE METAL INDUSTRY is now ready to hear from any reader who is interested just what his opinion is of boron and boronized products. The manufacturer has shown us orders and repeat orders from some of the leading manufacturers of the United States and Canada and also letters setting forth the advantages to be gained by using these compounds in the melting of metals. Surely, judging from the testimonial letters and repeat orders the products must have merit and yet a number of metallurgists declare that the products are mis-named and have no metallurgical value! In order to get at the truth THE METAL INDUSTRY invites a discussion from makers and users.

Let there be free speech! On our part we assure to all an absolutely free press.—Ed.]

A SATISFACTORY SHORT STORY

CHAPTER I. THE PLOT.

To the Editor of The Metal Industry:

We have experienced considerable difficulty in galvanizing (either hot or cold) tempered spring steel refrigerator hinges. We find that the galvanizing so affects the metal that it is very apt to break, or in some cases takes the temper out of it. Is there no way of eliminating this trouble, or is there a way in which it can be galvanized and tempered in oil afterwards? Some information along the above line would be greatly appreciated.

Vokes Hardware Company.

Toronto, Canada, October 5, 1916.

CHAPTER II. THE SOLUTION.

The solution of the difficulty is to use a galvanizing solution that will not occlude the hydrogen in the steel, as that is the cause of the brittleness and the breaking of the hinges which are made up of tempered spring steel. To prepare such a solution use the following materials:

Water	1	gallon
Sodium cyanide	3½	ounces
Zinc cyanide	4	ounces
Caustic soda	5	ounces

The temperature should be 110 degrees Fahr. and the voltage from 4 to 6. In preparing the steel use the alkali cleaning methods, but avoid the use of acids if possible. The zinc deposits very readily from the solution and it is not necessary to be so particular in the cleaning operations as when using an acid zinc solution. If cyanide mixture is used in preparing this solution, then the proportions given for sodium cyanide must be increased one-third.

The Metal Industry.

CHAPTER III. THE CLIMAX.

To the Editor of The Metal Industry:

Sometime ago we secured from you some valuable data re electro galvanizing spring steel hinges. We are pleased to report to you that we have galvanized a lot of these and find that by following explicitly your instructions we succeeded in getting splendid results which are most satisfactory to our customer, and thus far we have not been bothered with such defects in the hinges as bending or breaking off.

Vokes Hardware Company.

Toronto, Canada, December 19, 1916.

FOUNDRY ARITHMETIC

To the Editor of The Metal Industry:

In foundries it is often desirable to transform the composition of one alloy in stock, whose chemical composition is known, to another of a desired composition. The transformatin involves the selection of the greatest ratio between two of the same constituents and the addition of other metals to make up the required composition. Three examples will illustrate the principles noted.

FIRST PROBLEM.

Given a mixture of 65% Cu + 35% Zn to transform to a composition of 60% Cu + 37% Zn + 3% Pb.

The ratio here is based on the copper percentages, i. e., 65:60 or 12/13.

	Lbs.	Lbs.	Lbs.
12/13 of 65 Cu + 35% Zn =	60 Cu +	32 4/13 Zn	
Add	0 Cu +	4 9/13 Zn +	3Pb
Total	60 Cu +	37 Zn	+ 3Pb

SECOND PROBLEM.

Given a mixture of 66% Cu 31% Zn + 3% Pb to transform to a composition of 60% Cu + 38% Zn + 2% Pb.

The ratio here is based on the lead percentages, i. e., 3 to 2 or ⅔.

	Lbs.	Lbs.	Lbs.
⅔ of 66% Cu + 31% Zn + 3% Pb =	44% Cu +	20⅔ Zn +	2Pb
Add	16% Cu +	17⅓ Zn +	0
Total	60% Cu +	38 Zn	+ 2Pb

If the per cent. is expressed in pounds it may be clearer as to the transformations obtained.

THIRD PROBLEM.

Transform a mixture of
66 lbs. Cu + 27 lbs. Zn + 4 lbs. Sn + 3 lbs. Pb to
a mixture of 60 lbs. Cu + 30 lbs. Zn + 8 lbs. Sn + 2 lbs. Pb

The ratio here is on the lead.

	Lbs.	Lbs.	Lbs.	Lbs.
⅔ of 66 Cu + 27 Zn + 4 Sn + 3 Pb =	44 Cu +	18 Zn +	2⅔ Sn +	2 Pb
Add	16 Cu +	12 Zn +	5⅓ Sn +	0
Total	60 Cu +	30 Zn +	8 Sn +	2 Pb

"Metallico."

A GOOD GUN METAL FINISH

Q.—Could you give me a good formula for a gun metal finish on iron or steel that will wear fairly well?

A.—For producing a gun metal finish upon iron or steel prepare a concentrated solution as follows:

Acetic acid—28 per cent	1 pint
Binoxide of manganese	6 ounces
Water	1 pint

Boil the solution for some time until as much of the manganese is absorbed as possible. Use this as a concentrated solution and add in the proportion of 1 to 2 ounces to each quart of water and bring to a boil. Then immerse the iron or steel articles in the solution until a gun metal finish is produced.

Then wash in boiling water and coat with a thin coating of boiled linseed oil, wipe dry and an intense black color will result.

The articles made from iron or steel may also be painted with the concentrated solution, allowed to dry and then boiled in clear water until the gun metal finish is produced. Other manipulations should then be followed as described above.—C. H. P.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ALLOYING

A.—Can you recommend some good alloy for use in setting diamonds in tools employed for dressing grinding wheels?

A.—At the present time diamond for dressing grinding wheels cost from $200 to $250 each, and the use of the so-called patent holders and white metal solders is not to be recommended as the diamonds very often get loose and are lost. The tin and lead base alloys are too soft and plastic to be of value for soldering diamonds into tools and zinc, or the zinc base alloys are too brittle.

A satisfactory method of procedure is to select a piece of cold rolled steel of suitable size for the tool and drill into it a hole just large enough to receive completely the diamond. It is dropped into the hole with a good cutting point outermost. Next a small amount of borax flux, preferably in the fused form, known as borax glass, is placed in the hole along with enough fragments of manganese bronze to cover the diamond. The tool is now heated until the diamond is thoroughly brazed into place. Finally, enough of the steel is turned off to expose the cutting point of the diamond. A tool made in this manner will withstand very rough usage.

Ordinary brazing solder may be used instead of the manganese bronze, but it is not by any means as strong, hard or tough. Silver solder, however, is a very satisfactory substitute for the manganese bronze, but rather expensive.—J. L. J. Problem 2,421.

CASTING

Q.—Would you kindly inform me of a composition for a suitable paint to be used in casting lead and antimony alloy on to itself. That is, if I take a casting of this alloy from a plaster pattern to form a female die and then cast the same alloy on to the female die to form a male die, the paint has to be used on the female die to keep the hot metal from melting it in the process of casting. At the present I use the ordinary plumber's "Smudge" and this is partially successful, but very often it fails and the metals melt together.

A.—If ordinary plastic red clay is stirred into a bucket of water until the mixture is of the consistency of thin paint and the slightly warmed female die is dipped into this and then dried, each time a casting is made, successful results should be had, provided the pouring temperature of the metal is not too high. It might be advisable to safeguard the process by casting the female die from a mixture of antimony 30 per cent. and lead 70 per cent., which has a melting point of 350 deg. C. and using the eutectic alloy of antimony 13 per cent. and lead 87 per cent., which has a melting point of 228 deg. C. for casting the male die. A special thermometer for use with these lead-antimony alloys may be obtained from the dealers in chemical supplies. It has two scales on its stem. One in black gives the temperature, the other in red indicates the per cent. of antimony corresponding to a given temperature. By the use of the two above alloys and a thermometer no trouble from melting together of the alloys should be experienced.—J. L. J. Problem 2,422.

Q.—We have some aluminum castings which are used for binoculars and it is necessary to have them finished first class. We grain and enamel these bodies. We are having some trouble with spongy metal, the holes not appearing until some machining is done; then it is quite expensive to throw them away. What we wish to know is if there is something that we can fill up these holes with. It will be necessary that the material will have to stand baking at 320 degrees without expanding or contracting and it cannot have any grease in it.

A.—The only method to pursue in filling up holes in castings after the castings have been made is to employ an aluminum solder, and the best formula that we know of for this purpose is composed of:

Aluminum	1 part
Phosphor tin	1 "
Zinc	11 "
Tin	29 "

There are, however, a number of aluminum solders on the market that might be used in place of this material if you found it did not stand the temperature of 300 degrees (which we presume to be Fahrenheit) mentioned in your letter. It would seem to us that you might eliminate the spongy metal altogether by using more care in the making of the castings; then soldering or filling up the holes would not be necessary. We believe that if you will use some aluminum manganese in the initial mixture you can overcome this trouble.—K. Problem 2,423.

CHEMICAL

Q.—What is the difference between soda ash and plain washing soda, and would the latter work just as well as soda ash in the solution?

A.—The difference between sal soda (sodium carbonate) and soda ash is that the soda ash has the water of crystallization nearly evaporated. The percentage of free alkali in sodium carbonate is 19 per cent, and in soda ash 58 per cent, so soda ash is three times stronger than commercial sodium carbonate, and only one-third of a pound is required against one pound of the sodium carbonate. If sodium carbonate is used in the cleaner in the place of the soda ash, three times as much by weight will be required to give an equal strength.—C. H. P. Problem 2,424.

CLEANING

Q.—I have been using for a time a cleaning compound recommended by a writer in your paper, consisting of equal parts of soda ash and caustic soda, with a small amount of sodium silicate and aluminum silicate. One cold morning the tank was almost a complete solid mass of soda crystals, apparently all that had been added to the solution. This, of course, was the soda ash. I cleaned them all out and made the solution up new. Would this old soda have been any good to use over again, or does it lose its strength after being used for some time? Should equal parts of the two ingredients be added when replenishing the bath, or does the soda ash remain in the solution and only the caustic soda lose its strength?

A.—If the solution had been heated up as usual, and the water that had evaporated had been replaced, the solution would have been as effective as usual. It is only the water that evaporates; the solids always remain behind. Deterioration of the strength of the materials naturally takes place and sodium carbonate results. This type of cleaner can be replenished after first being prepared by the addition of small amounts of caustic soda and sodium silicate. About a quarter of an ounce of the sodium silicate per gallon of solution will be ample.—C. H. P. Problem 2,425.

MELTING

Q.—We have started melting our scrap platinum and have had fine results for weeks, but two or three melts give us a lot of

trouble by cracking and blistering during rolling. We do not use any flux. Should we use one? If so what? We have been told to stamp the button of platinum as soon as it cools a little. Is this good practice?

A.—The principal cause of brittle platinum is due to the fact that a mixture of other metals is probably in the platinum scrap. When platinum filings are to be melted, the foreign metals should be removed by washing in hot nitric acid. Gold filings can be removed by tying the scrap in a chamois bag and making it the anode in a cyanide solution, or washing the scrap for a few minutes in equal parts of nitric and muriatic acids. The mixed acids must be used cold, otherwise some of the platinum will be dissolved. The button of platinum should be well puddled before being allowed to cool so as to burn out the impurities. It is not necessary to use a flux for melting platinum. The button is usually hammered while at a white heat to give the metal a closer grain. Sometimes an unbalanced flame or an intermittent heat causes a poor melt.—O. A. H. Problem 2,426.

MENDING

A.—I have two crucibles which have been damaged by putting them in the furnace before annealing. The bottom of the crucible has parted from the upper portion, but not to the extent that they cannot be used. It is, however, not safe to use them as they are. Can you tell me of a fire clay, dolomite or similar mixture to repair them? The crucibles are graphic. I may say I tried to repair them and succeeded in getting 14 heats of bronze out of them. What I used was common fire clay with a bonding material of core gum, then gently dried and annealed them and placed in cool fire.

A.—When a cracked crucible is to be repaired the crack should be enlarged with a sharp knife or tool until a cavity of the shape of a double-headed rivet is obtained.

Next fill in the opening with a silicious, non-shrinking fire clay mixed with water glass. Build up until about 0.25 inch thick, taper the edges and smooth down with a swab dipped in water until even and smooth on the crucible. If the crucible is an old one the glazed surface should be filed away for a couple of inches around the crack, and then this surface roughened by scoring with a file. Dry the patch slowly for several days so that no blisters or cracks form, then gradually increase the heat. In this way the patch is keyed in or held securely in place. Cements already prepared my be obtained from many of the crucible manufacturers for making repairs of the character described.—J. L. J. Problem 2,427.

PLATING

Q.—I am having trouble at the present time plating nickel silver otherwise known as German silver. What I would like to know is does fire lay below the surface of the metal. I am under the impression that it does, especially hard soldered German silver, because sometimes it comes out of the silver bath with a scale the same as when it is being annealed and before it is sand buffed.

A.—In plating German silver the following methods should be followed for successful results: First, after polishing cleanse in the usual manner; second, use an acid dip for removing the oxide—1 pint of muriatic acid and 1 gallon of water; third, immerse in the blue or mercury dip. This dip is composed as follows:

Water	1 gallon
Cyanide of sodium	12 ounces
Red oxide of mercury	1 ounce

Immerse the articles for a second or two, then wash and strike in silver. Fourth, the silver strike should be prepared as follows:

Water	1 gallon
Cyanide of sodium	8 ounces
Silver cyanide	½ ounce

Finally plate in a regular silver solution.—C. H. P. Problem 2,428.

POLISHING

Q.—We are having considerable trouble with the bearings on our polishing lathes heating and smoking.

A.—Bearings or boxes that heat up can sometimes be overcome by washing them out with kerosene or gasoline to clean out the dirt, grit or metal particles that may be in them. This method must be used cautiously as it will wash away all the lubricating oil. A good supply of lubricating oil should be applied as soon as the dirt, etc., is cleaned out. If possible kerosene should be used in preference to gasoline.—P. W. B. Problem 2,429.

Q.—What is the latest and best method of balancing a polishing wheel?

A.—The best and most satisfactory method of balancing polishing wheels is the use of a patented oblong washer. These washers come in various sizes to fit the spindles, and they can be so adjusted that a perfect balance to the wheel is obtained. The washer can be moved up and down while slightly fastened by the spindle, and is replacing lead nails, iron washers, etc., in producing a balance.—C. H. P. Problem 2,430.

SILVERING

Q.—We are having considerable trouble silver plating our vanity cases. The outside is 18 per cent. German silver, while the inside lining and bezel are high brass. The outside plates in a satisfactory manner, but the inside lining and bezel frequently strip under the influence of the scratch brush wheels.

A.—The reason that the silver strips from the parts made from high brass is that they are silvered by simple immersion before the silver is deposited by the electric current. By using an amalgamating dip the brass will be covered with a thin film of mercury, which will prevent it being silvered by simple immersion, and you will have no further trouble by stripping. A five-gallon mercury dip should contain:

Water	5 gallons
Cyanide of sodium	12 ounces
Caustic soda	10 ounces
Corrosive sublimate	6 hundredweight

As the mercury is drawn out of the dip quite rapidly, a small quantity of corrosive sublimate must be added from time to time in order to keep the solution working properly.—O. A. H. Problem 2,431.

STRIPPING

Q.—Is there any scientific explanation of the fact that an acid strip will remove nickel from brass, nickel, silver, etc., but not from iron or steel? Is it because some kind of electric action takes place in the former metals that is absent in the latter?

A.—The only scientific explanation to your question as to why the ordinary acid strip composed of sulphuric and nitric acids will remove nickel from nickel, silver, brass, copper, etc., with very little action, while the reverse is the result when nickel is stripped from iron or steel is that nickel is electro positive to both iron and steel, and electro negative to copper, brass, bronze, etc. Sulphuric acid has practically no action upon the nonferrous alloys of copper and zinc, but its action upon iron or steel is the reverse as hydrogen is evolved very rapidly in proportion to the strength of the solution used. The evolution of hydrogen may prevent the reduction of the nickel in a normal manner.

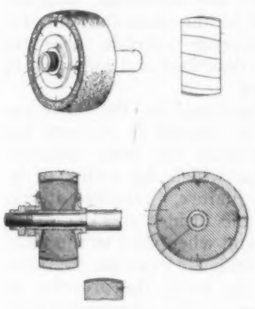
Frequently, when iron castings have been over-pickled with sulphuric acid solutions hydrogen occludes, and when an effort is made to nickel plate them nickel will not deposit owing to the liberation of hydrogen in excess. This is the only explanation we can give you.

Iron becomes passive in clear nitric acid, so if iron or steel nickel plated articles are immersed in undiluted nitric acid, the nickel will be reduced to a nitrate without any effect upon the steel. This method is used by manufacturers of shears, manicure instruments, etc. A little common salt when added to the nitric acid is found very effective, but not more than 2 ounces should be used per gallon. Water must be avoided, for if the nitric acid becomes diluted with water a reducing action will develop upon the steel.—C. H. P. Problem 2,432.

PATENTS

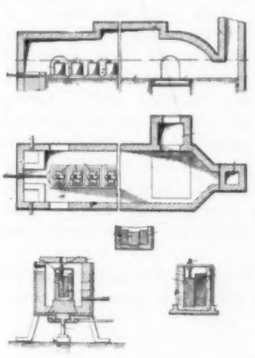
A REVIEW OF CURRENT PATENTS OF INTEREST

1,216,244. February 13, 1917. **Polishing Roll.** Alexander McDowell, of Lynn, Mass.; Ida R. McDowell, administratrix of Alexander McDowell, deceased, assignor to Valentine H. McDowell, of Lynn, Mass.



This invention relates to an improved roll adapted for use in the arts for the purpose of giving a polished finish to articles of all sorts. The purpose of the invention is to provide a new construction of roll whereby the same may be maintained in sufficiently firm condition to do its work properly, without at the same time being made too hard, and in which also the degree of capacity of yielding of the operating surface may be regulated and adjusted without causing a departure from the true circular form. The precise nature of the roll which has been devised to have these characteristics is illustrated in the drawings accompanying the same. These drawings show the preferred embodiment of the invention in practical form, without being intended to represent the only possible embodiment or to limit the invention beyond the statement in the broadest of the claims of the patent.

1,217,581. February 27, 1917. **Process of Making Clad Metals.** Byron E. Eldred, of New York, N. Y., assignor to the Commercial Research Company, a corporation of New York.



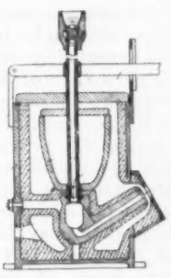
This invention relates to processes of making clad metals, and it comprises a process of firmly and permanently uniting bodies of unlike metals such as copper and steel, copper and nickel, etc., as shown in cut, with a union which is, or is equivalent to, a weld union wherein bodies of such metals are placed with the line of intended union in a substantially vertical plane, are heated to a temperature equaling but preferably not much above the melting point of the lower melting metal, and the assembled metals are positively cooled in a methodical manner, such cooling being so conducted as to maintain a portion of molten metal under the influence of heat at the uppermost point along the line of intended union until the completion of such union, solidification of the metal along such line being caused to progress gradually upward.

1,217,710. February 27, 1917. **Metallic Compound.** Herbert B. Coho, of Mount Vernon, N. Y., assignor to United Lead Company, a corporation of New Jersey.

This invention relates to compounds in which the basic elements are lead and copper alloy and tin held in suspension with sulfid of antimony.

The object of the invention is to produce a compound of the character described that may be readily commingled, economically produced, and which will result in a metallic compound that is susceptible of varied and extensive utility. Another object thereof is to produce an alloy of lead and copper combined with sulfid of antimony and tin resulting in a compound that may be successfully employed as a substitute for Babbitt-metal with advantageous results. And a still further object of the invention is to produce a metallic compound of the character described in which the fluidity of the mixture is greatly increased to render same capable of being cast into small articles.

1,217,662. February 27, 1917. **Process and Device for Casting Metals Under an Explosive-Like Pressure Into Molds.** Heinrich Talla, of Heilbronn-on-the-Neckar, Germany, assignor to Präcisionsgusswerke System Schmidt-Reichhardt G. M. B. H., of Frankfort-on-the-Main, Germany.



This patent covers:

A process for casting liquid metal or other melting materials into molds, consisting in filling a quantity of the metal into a loading space and in throwing said quantity of metal into the mold by the force of the explosion of a solid explosive material, said material being ignited in the loading space by the hot metal.

In a device, as shown in cut, for casting liquid metal and other melting materials into molds a melting furnace, a crucible arranged in said furnace, a loading space, a valve, said valve being adapted to shut off said loading space from said crucible and having a hollow spindle, said spindle being adapted to convey explosive material to said loading space, a channel adapted to form an open communication between the loading space and a mold.

1,218,158. March 6, 1917. **Polishing Body for Burnishing Barrels.** Joseph C. Andrews, of New Britain, Conn., assignor to American Hardware Corporation, of New Britain, Conn., a corporation of Connecticut.

This invention relates to improvements in polishing bodies for use in burnishing barrels, and has for its object to produce a tumbling element, which is adapted to contact with surfaces having varying curvatures and irregularities on the object to be burnished, without being liable to enter or be caught in holes or corners, and consists of a special shaped tool, as shown in cut, composed of a solid body of hard metal, formed with a central spheroid section, and having conoidal extensions at two points—each extension having a rounded end and at its base flaring outward in a curve to join the surface of the central spheroid.

This special shaped tool will burnish articles having angular or curved surfaces, and because of its large central portion will not enter and become caught in holes of less diameter than the spheroid and substantially larger than the ends of the extensions, or in corners of the articles with which it is used, while the small diameter of the ends permits the ends to successfully burnish the angles and curves.

1,218,394. March 6, 1917. **Coating for Molds and Cores.** J. C. Gernelle-Danloy, of Moulins, France.

The present invention relates to a product destined to replace black lead and other products usually employed to coat molds and cores made out of sand, which are intended to be dried or baked before casting.

This product can be employed for castings of steel, cast-iron, copper, bronze, aluminum and all metals in general.

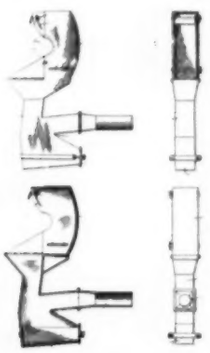
The improved product is composed of coke dust, wood charcoal, pipe clay, and starch, the latter partly in the form of powdered raw starch and partly in the form of a dried starch paste.

Under the term "coke dust" is understood the impalpable powder derived from hard washed coke of a quality suitable

for metallurgical operations broken and ground to a fine powder.

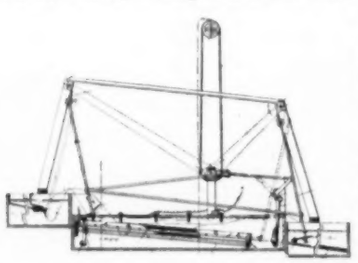
1,218,652. March 13, 1917. **Hood for Buffing Wheels.** W. H. Hauser and J. McDaniel, of Evansville, Ind.

This invention relates to hoods for buffing or grinding wheels.



The object of the invention is to produce a hood, as shown in cut, of the character described adapted to partially surround a buffing or grinding wheel of ordinary construction and recover the particles of metal that are cut from the article ground upon the wheel. A further object of our invention is to produce a hood adapted to protect the operator from the flying particles and to draw such particles away from the operator and to deposit same in a receptacle in which same may be conveniently removed. A further object thereof is to produce an article of the character described adapted to be conveniently adjusted to accommodate the character and size of the article to be ground. A still further object thereof is to produce a hood and suction device adapted to deflect particles produced from the grinding wheel from the face of the operator and deposit same in a receptacle from which they may be removed; and a still further object of our invention is to produce a more simple, cheap and efficient hood of the character described than has heretofore been attained.

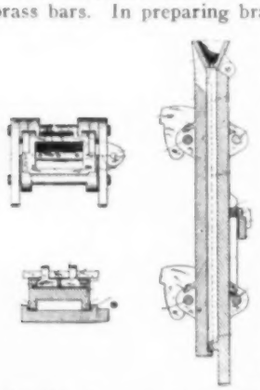
1,218,802. March 13, 1917. **Apparatus for Electroplating Pipes, Rods, Etc.** Nelson H. Raymond, of Buffalo, N. Y., assignor to Clifton Manufacturing Company, of Jamaica Plain, Mass., a corporation of New Jersey.



This invention relates to an apparatus, shown in cut, for electroplating pipes, rods and similar articles, and has the object to provide an improved apparatus of this character containing means for feeding the pipes automatically step by step from the receiving end of the electroplating tank to the delivery end thereof and also to provide improved means for automatically feeding the unplated pipes or rods from a source of supply to the receiving end of the electroplating tank and to automatically remove one pipe or rod at a time from the delivery end of the electroplating tank to a receptacle or place of deposit.

1,219,180. March 13, 1917. **Mold for Casting Brass Bars.** J. C. Somers, Waterbury, Conn.

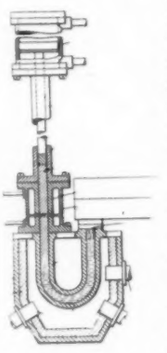
This invention relates to an improvement in molds for cast brass bars. In preparing brass for rolling into sheets, it is first cast into bars which are subsequently rolled to the desired thickness.



The inventor claims: A mold, as shown in cut, for casting brass bars comprising a back plate and a front plate, said plates formed with overlapping flanges, said plates formed at one side with knuckles, a pintle extending through said knuckles whereby the plates are hinged together, transverse rods mounted on the front and back plates, latches pivotally connected with the ends of the rods on the back plate and adapted to engage with the ends of the rods on the front plate, whereby the two plates are locked together, the said back plate formed at its rear with undercut guides, a slide entered between said guides and formed with hooked fingers, and a support for said fingers whereby the molds may be held in an upright position.

1,219,358. March 13, 1917. **Method of Molten Metal Feed for Die Castings.** John K. Stewart, of Chicago, Ill.; Julia B. Stewart, executrix of said John K. Stewart, deceased.

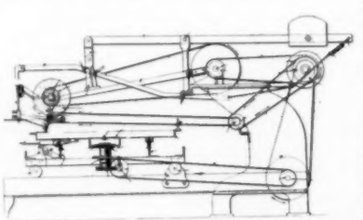
The purpose of this invention is to provide an improved method for heating metal to be used for casting and feeding the molten metal to the molds under pressure. The means for putting this method into practice are somewhat diagrammatically illustrated in the drawings, but the method itself comprises certain essential features hereinafter described and indicated by the appended claims.



The apparatus illustrated in the drawings and the process it is adapted to perform has been particularly worked out with reference to casting aluminum, which, by virtue of its basic or alkaline nature, rapidly attacks metallic containers and fittings such as valves on such containers, and when used in the usual die casting process with air pressure for forcing the metal into the mold, the presence of the air under pressure tends to increase the chemical action between the aluminum and the other metal of the container, making frequent replacements necessary and seriously hampering the work.

1,219,037. March 3, 1917. **Grinding or Polishing Machine.** T. F. Philippi, East St. Louis, Illinois.

This invention relates to a machine particularly adapted for use in polishing tubular articles, but it is to be understood that some of the elements of the machine may be used for various other purposes.

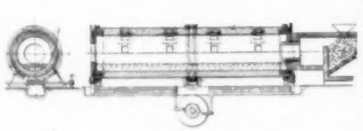


One of the objects of the invention is to produce a simple and efficient means, as shown in cut, for holding and rotating the article to be operated upon by the machine. In the preferred form of the invention a rotatable work holding device is adapted to enter the ends of a tube so as to constitute an internal support for the tube, the entire outer face of the tube being exposed to the polishing wheel or other work engaging member.

Another object is to provide a simple means for automatically disengaging the polishing wheel from the work upon the completion of each polishing operation.

1,220,111. March 20, 1917. **Apparatus for Refining Metals by Heating.** Alois Helfenstein, of Vienna, Austria-Hungary.

The present invention is carried out in the following manner: In a long tubular furnace, as shown in cut, a metal bath layer which is very thin relatively to the diameter is heated by the direct passage of current in the longitudinal direction of the metal bath as well as by fuel heating over the bath for the purpose of effecting the refining process more quickly and more satisfactorily. The thin extended metal bath presents on the one hand to the fuel heating and to the refining substances a surface which is large relatively to the cross section of the bath so that the refining action is more quickly effected. On the other hand, the heating of shallow baths requires less strength of current and the extended form of the bath enables higher potential to be employed, so that the electric heating is more intense, and the process accelerated. Moreover the gas removal period (deoxidation), in connection wherewith cooling must be again effected, can be more quickly carried through.



EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

MODEL METAL FOUNDRY

By Deutsch and Polis, Architects and Engineers, New York.

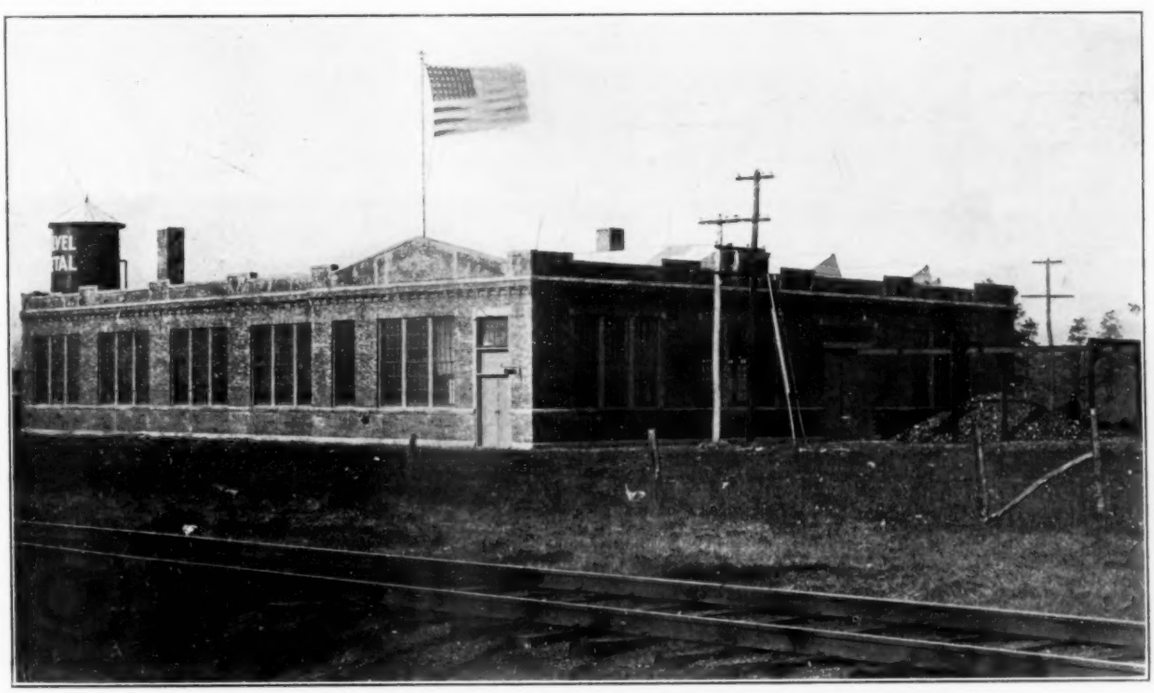
A foundry whose plan and equipment may be taken to be as near model as can be designed has recently been completed at Farmingdale, L. I., N. Y. The plan of this foundry, which was built for the Silvel Metal Manufacturing Company of New York, is shown to good advantage in Fig. 2, while exterior and interior views are given in Figs. 1 and 2. Some of the factors which entered into the design of this foundry were as follows:

1. In order to procure the best light it was decided that the building should be one story in height.

2. An opportunity for expansion was to be provided.

3. The costs of bringing sidings, light and power service to the building were to be as low as possible.

4. Building was to be kept sufficiently away from the lot lines to permit of additional siding, platforms, small out buildings and sewage system to be placed without encroaching on the building.



THE NEW FOUNDRY OF THE SILVEL METAL MANUFACTURING COMPANY AT FARMINGDALE, L. I.

After taking all these matters into consideration it was decided to locate this building with the front parallel to and about 100 feet from the railroad track, and to arrange the building so that it was at least 30 feet from any lot line—in this case the easterly lot line. The west wall of the building was to be made a temporary wall so as to permit of future extension westward, while the other three walls were to be permanent walls. It was decided to make this building 108 feet frontage and 100 feet in depth, and to contain permanent storeroom, offices, railroad sidings, light, power and telephone poles near the easterly lot line so that same would not be interfered with during future expansion. The washroom, which required future enlargement with enlargement of plant, was placed at the westerly end of building at the southwest corner, so that the sewer and sewage system could be placed to the front of building, not interfering with future expansion.

CHOICE OF CONSTRUCTION.

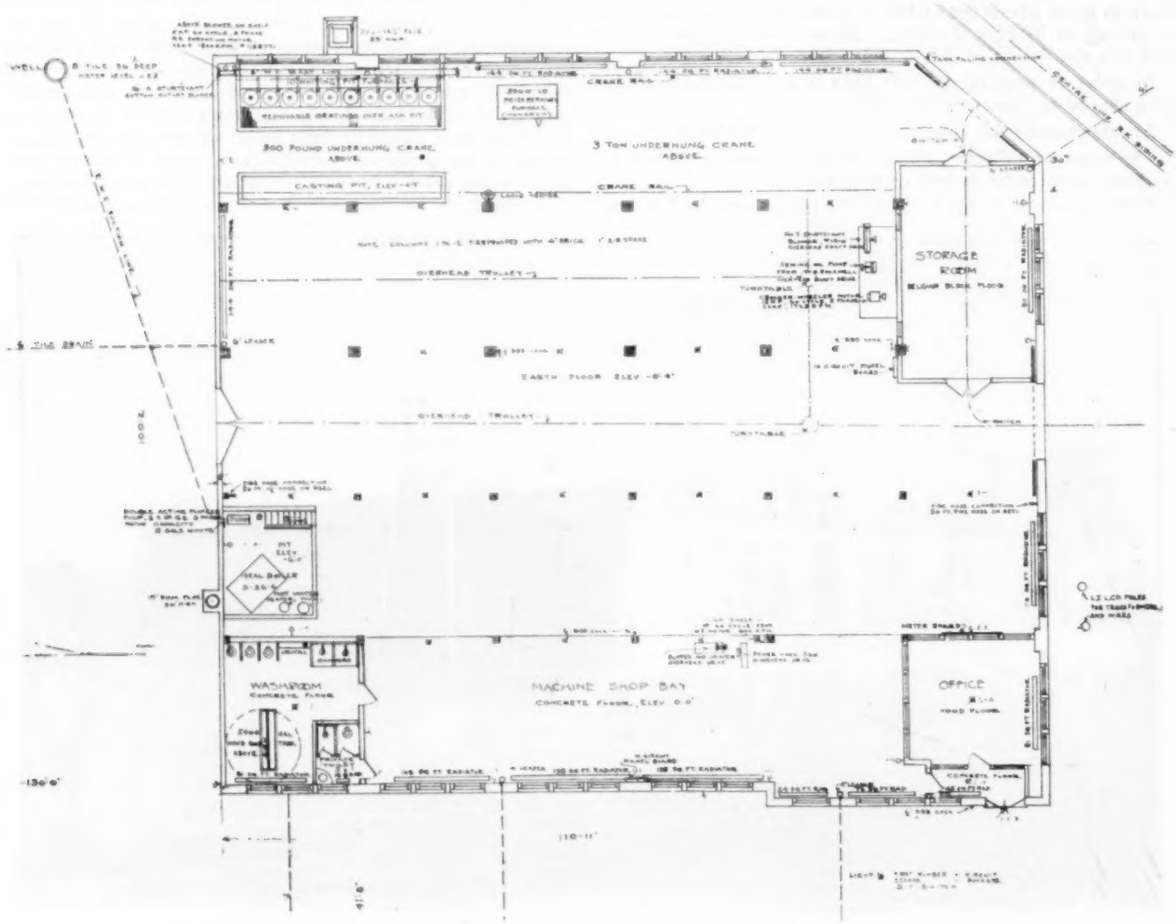
After a careful consideration of present costs of material and the ability to secure same with the least delay, it was decided to construct this building of brick walls and wood columns and saw-tooth roof. The building is divided into panels measuring 18 feet 3 inches east and west, and 19 feet 9 inches north and south, giving respectively six and five panels in these directions. The four most northerly bays have saw-tooth construction, consisting of wood trusses spaced 6 feet 1 inch on centers and covered on the solid side with 1½-inch yellow pine sheeting. The most southerly bay has yellow pine roof beams spaced 20 inches on centers and covered with 1-inch yellow pine sheeting. All posts were made 8 inches x 8 inches of yellow pine, and were supported on concrete footing 2 feet square and 2 feet thick. All outside walls were made of brick 12 inches thick with concrete beltcourses, parapets and other ornamental work for architectural effect. The westerly wall was made 8 inches in thickness and without any exterior architectural finish, as it may be removed when the plant is enlarged.

LIGHTING OF FACTORY.

A properly designed sawtooth roof construction provides the maximum facilities for light and air, and is the ideal one for factories. These roof sawteeth provide light surface of about 2,500 square feet of glass with a northern exposure, which prevents the direct sun glare from interfering with the operations of the factory. In addition to this the building is provided with

40 windows each containing 34 square feet of glass, so that the total glass area available for lighting purposes is equal to approximately 3,800 square feet or 1 square foot of glass for 3 square feet of building floor area. This large glass surface provides exceptional natural light for every square foot of the building, and is an important aid in developing an efficiency in production which can only be secured in a well lighted factory.

The electric lighting equipment was designed with a view of eliminating all shadows that could be cast by the overhead trolley and crane system, roof trusses, etc. It became apparent that this could not be accomplished by suspending lights in the center of panels between columns, and the outlets were therefore placed at the middle of girders between columns. The factory is therefore lighted by drop lights with 100 Watt Nitrogen lamps suspended about 9 feet above the floor, excepting along the northerly row of posts, where the suspension is about 11 feet above the floor. All drop light wiring is protected near the north end by iron pipe stems to which the sockets are screwed.



PLAN VIEW OF THE SILVEL METAL MANUFACTURING COMPANY'S FOUNDRY.

Around the walls at all piers are placed brackets containing 60 Watt Tungsten lamps, also placed about 9 feet above floor. Wherever necessary in the vicinity of machinery, plug outlets were placed about 2 feet above the floor, and the electrical contract required that hand-lamps with 15 feet to 30 feet of flexible cord be furnished.

It will be noted that a 100-Watt lamp is used to light about 360 square feet of floor area, which is less than three-tenths of a watt per square foot. Although this is about the minimum amount of light usually recommended, the lighting outfit as installed has been found all that can be desired both as to the amount of light and the lack of shadows. The entire plant is thoroughly ventilated by the use of four Sturtevant blowers.

GENERAL ARRANGEMENT.

Cranes and overhead trolleys: The general scheme of manufacturing contemplates having the material enter the building near the northeast corner, from which it is carried by overhead trolley to the storeroom. This storeroom is also used as a mixing room from which the charges are delivered to the various furnaces. After the melting and casting operations of the metal have been performed, the ingots of metal are delivered directly to the siding after being weighed; or, if any machine work is required, this must be performed before delivered back to the siding. With these points in mind a storeroom was laid out near the east wall, close to the middle entrance door; the large metal furnaces were placed along the north wall close to the storeroom, and the pit furnaces and casting pits were placed near the northwest corner. In order to facilitate rapid and proper handling of raw material and charges, a crane system was placed in the north bay, and an overhead trolley system with turn-tables and switches was placed in the next two adjoining bays, and also in the easterly bay through the storeroom. This extensive trolley system is extended to the railroad siding. Material is unloaded by skips from the railroad cars, and is then carried by the trolley directly into the storeroom, or if not to be stored, to any part of the building desired. Turntables permit of right angle switching and a simple method of swinging from the overhead trolley to the crane has been devised, and is giving complete satisfaction. Charges are brought from the storeroom to the various furnaces by means of a hand crane with a capacity of three tons. This crane is fully capable of taking the complete melt of a large furnace.

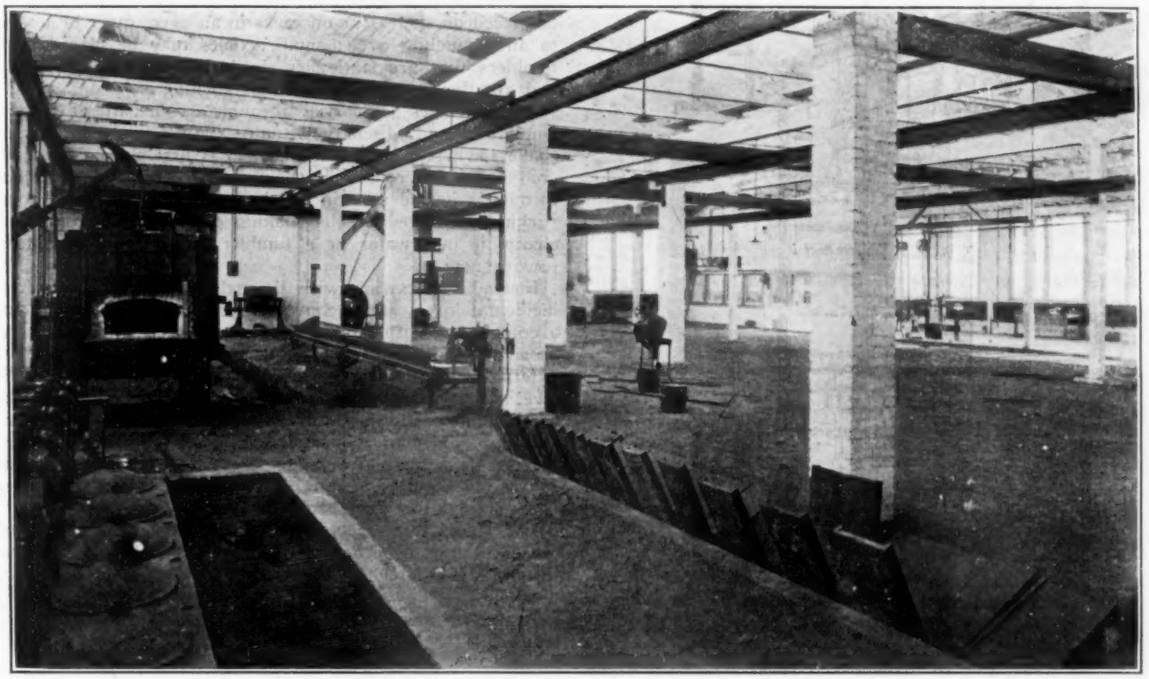
In order to facilitate operations at the pit furnaces where loads not in excess of a quarter of a ton are to be handled, a small auxiliary crane with a capacity of about 500 pounds, underhung from the same rails that carry the large crane, has been installed in the north bay.

SEWAGE DISPOSAL.

As there is no public sewer near this plant it became necessary

to design a separate system of sewage disposal. After comparing the costs of cesspools, which would require occasional cleaning and the removal of the solid accumulations with that of a septic tank system with tile disposal field, it was found more practical as well as economical to adopt the latter.

In order to follow the best practice in such matter, the septic tank was located about 40 feet in front of the building near the railroad track, the natural topography permitting the tank to be placed close to the ground after the house sewer had been given a proper slope to the tank. A tile sewer runs from the septic tank in a westerly direction for a distance of 150 feet, to the tile disposal field, consisting of a central main and side branches placed with open spaces between the tile so that the sewage could run into the ground freely to be purified.



INTERIOR OF THE SILVEL FOUNDRY AT FARMINGDALE, L. I.

FURNACE EQUIPMENT.

The company considered it advisable at the start of the business to turn out only ingot metal, but provisions have been made for an early installation of rolling, wire drawing, annealing and other machinery for which the two middle bays have been set aside, as shown. In the south bay the machine shop containing a complete equipment of tool machines is to be installed. This bay has a width of about 20 feet, and a length of about 72 feet. A heavy concrete floor has already been provided, upon which these machines are to be placed. At the northwest corner of the north bay, ten No. 3 Whiting pit furnaces have been installed. These are of the standard brass melting equipment type. All of these ten pit furnaces are connected by means of a master flue to a brick chimney about 33 feet high, with a 22½-inch square flue. Either natural or forced draft can be used for the operation of these furnaces. The forced draft is obtained by the operation of a No. 4 Sturtevant blower belt connected to a 5 h.p. General Electric induction motor (60 cycles, 3 phase, 120 volts, 1,800 r. p. m.). The forced draft from the blower is brought to each individual furnace from an 8-inch wrought iron air main about 3 feet above the cast iron bin plates in back of the furnaces.

About 6 feet from the concrete wall of the ash pit is the casting pit about 4 feet by 28 feet. The bottom of the pit is about 4 feet 9 inches below the foundry floor, and provision has been made for casting in ingots of various lengths by the installation of removable bearing plates supported on lugs projected from the sides of walls of casting pit.

One No. 43 Monarch reverberatory furnace 9 feet deep 5 feet wide and 6 feet 7 inches high over-all has been installed along the north wall near the pit furnaces, and room has been left to the east of this one for the installation of three similar furnaces.

All four are to be connected direct to the main air blast line already installed. This furnace has a rated capacity of 5,500 pounds of metal every 90 minutes. Each of these furnaces is equipped with two fuel oil burners for operating with air from 2 to 12 ounces of pressure. The total capacity of the plant is 14,000 tons per annum. This foundry, which was designed and whose construction was supervised by Deutsch & Polis, architects and engineers, 50 Church street, New York, was built for the Silvel Metal Manufacturing Company for the purpose of producing in large quantities Silvel metal, a copper-manganese alloy, which is just being put upon the market. This alloy, which is the invention of M. L. Jacobs, is non-corrosive and can be cast, rolled, spun or drawn into wire, and is to be used for all purposes that a malleable white metal is adapted for. It is the intention of the company at present to manufacture this metal in ingot form only.

IDEAL AIR BRUSH

A new air brush has just been placed on the market by the Ideal Air Brush Company, New York, N. Y., and the manufacturer states possesses several advantages over other air brushes in use. The cardinal feature claimed for this air brush is that it can be regulated by simply turning a small nut either way, which so adjusts the spray nozzle as to enable the user to make from the finest line up to the largest spray.

The brush is recommended strongly for all medium and light color enamels and lacquers and can be used for finishing leather, buttons, chandelier, wall paper, artificial flowers, glassware and all kinds of art work. The Ideal air brush is manufactured in four grades from No. 0 to No. 3. The one shown in the cut being No. 3, and is used for very heavy colors, especially for coating glass, metal and ammunition purposes. The Ideal company also furnish and install air compressor plants consisting of a compressor, air tank, exhaust hoods and anything that is necessary for carrying on the spray operations. This brush is shown in the advertising pages of this issue of THE METAL INDUSTRY.

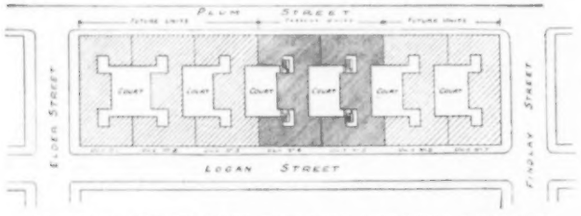
APARTMENTS FOR THE WORKINGMAN

Factory owners and executives in Cincinnati, Ohio, are particularly interested in two model tenements that have just been completed on the west side of Logan street, midway between Findlay and Elder streets. They see in them the possible solution of housing economically industrial workers in large cities in an entirely sanitary and wholesome manner.

The average rental to be charged will be probably about $1.10

FLOOR PLAN OF MODEL APARTMENTS.

per room per week, this to include heat from a modern vapor system. The apartments vary in size from one to four rooms. Five-story buildings were decided upon. Each of the present units contains 53 apartments. The accompanying floor plan shows the arrangement of the apartments. In place of two apartments there are public baths and showers, and an office for the superintendent of the building. Besides the modern heating system in each apartment, there is a gas stove and other necessary conveniences. Screens are supplied for all windows. The



PLAN OF APARTMENTS SHOWING LIGHTING FEATURE

children throughout each tenement have the advantage of a well-equipped playground and nursery on the roof.

A notable feature of the project, and one of prime importance, is the thoroughly fireproof construction used. The walls are of brick and the structural columns and beams and the floors are of reinforced concrete. The partitions between the rooms are fireproof, and the doors are metal. In addition to this, the stairways serve the double purpose of stairway and fire-escape, for while they are protected from the weather they are not entirely enclosed.

William Emerson, of New York City, who has made a study of tenement construction, drew up the plans for these model tenements. The building work has been done by The Ferro-Concrete Construction Company, of Cincinnati.

EPICASSIT*

Epicassit is an invention consisting of powdered metal, usually either tin, lead, zinc or their alloys. These are mixed with a suitable fluxing carrier to the consistency of a smooth, creamy paint. This is evenly coated on the well-cleaned article. Heat is then applied to melt the coat down. Nothing simpler could be conceived.

Details will vary with the nature of the article to be coated. Epicassit lends itself to the widest possible range; the cold paint may be applied with the brush just like ordinary paint, or the article may be dipped into the cold bath, or it may be drawn through it, or tumbled in it. Again, the heat may be applied in whatever way is most convenient; the cold-painted articles may be placed on shelves or on racks in an oven, more or less similar to an enameling oven; small articles may be placed in heated tumblers that are stationary until the coating is melted down and are then tumbled to prevent sticking.

Other articles are carried through a cold bath of Epicassit on conveyors and discharged onto slightly inclined coarse sieve shakers where superfluous material is first shaken off and gathered again for reuse; in their further travel the articles pass through a heated zone in which the coating is melted down and sticking prevented by the shaking of the carrier; the final discharge is into water or a tumbler with polishing material, as sawdust, etc.

Instead of drawing wire through a hot bath with its many incidental losses and inconveniences, the wire is drawn through a cold bath of Epicassit, or that is applied by rotating brushes or a spray; in its further progress the wire passes through an externally heated tube of uniform temperature and onto a reel. The entire wire coating process is continuous from start to finish. The costly, wasteful and troublesome hot bath is avoided entirely. The entire operation is carried through a very short space. By a tandom arrangement successive coats are applied.

The invention is of foreign origin; it is broadly covered by U. S. patents that have been acquired by Henry Hess.

Mr. Hess, Witherspoon building, Philadelphia, will grant licenses to use the process; the material itself can be purchased through Hess & Son, 1033 Chestnut street, Philadelphia.

*Epicassit was first described in THE METAL INDUSTRY, September, 1914.

UNIVERSAL SOLDERS

An interesting series of solders have just been placed upon the market by the Universal Solder Company, Detroit, Mich. These solders are made in three classes. No. 1, which is used for mending cut glass, china and crockery, is transparent and will stand washing in hot and cold water. No. 2 is for stopping leaks in aluminum, tin, copper, brass, zinc pots and pans of all kinds, hot and cold water pipes and hot water boilers, water boxes and so forth. This solder will stand hot and cold water and steam, and also 2,250 degrees of heat without melting. No. 3 solder is used on locomotive and stationary engines, and it is claimed will stop all leaks in automobile radiators, cylinders and metal roofs and water jackets and so forth. These solders are all used without heat or acids and are guaranteed to contain no injurious ingredients. The solders are put up in collapsible tubes, packed in display cartons containing six tubes of No. 1, twelve of No. 2 and six of No. 3, and the tubes sell for 25 cents each.

SAFE PRACTICES

The National Safety Council, of Chicago, Ill., which is the leading accident prevention agency of this country, has a committee of fifty safety experts working out the maximum and minimum requirements in safeguarding in factories and shops. It is the purpose of the council to issue the findings of these experts in monthly leaflets which are entitled "Safe Practices," and three of these leaflets have already been issued--Ladders, Stairs and Stairways and Boilers.

Additional information regarding the work of the National Safety Council may be had by corresponding with the council at its headquarters, 208 South La Salle street, Chicago, Ill.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTRO-PLATERS SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, H. H. Williams, St. Louis, Mo.; Secretary-Treasurer, Walter Fraine, 507 Grand Ave., Dayton, Ohio. All Correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The Society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held at St. Louis, July 5, 6 and 7, 1917. The branch associations hold monthly and semi-monthly meetings in their various cities.

H. H. Williams, Chairman of the Publicity Committee, makes the following announcement:

The annual convention will be held in St. Louis, Mo., on Thursday, Friday and Saturday, July 5, 6 and 7. The following committees have been appointed and are at work: On entertainment, E. J. Musick, chairman; G. S. Robins, E. A. Zott, L. L. Gaus, C. L. Weygandt; on exhibit, F. C. Rushton, chairman; J. T. McCarthy, H. Deubelbeis, P. Fressider, H. G. Nestman; on papers, H. J. Richards, chairman; E. W. Heil, Prof. W. V. Hoyt; on publicity, H. H. Williams, chairman; G. Lamkemeyer, T. Carson, C. C. Deubler. Others may be added as occasion requires, as several changes will be made from usual program. The exhibit and papers' committees have communicated with the several branches and request the co-operation of all.

Any communication for information should be addressed to F. C. Rushton, secretary St. Louis Branch, 4405 Blair avenue, St. Louis, Mo.

New York Branch, H. H. Reama, president, and William Fisher, secretary, 300 St. Anns Avenue, New York.

On March 23 the New York branch of the Electro Platers' Society held their regular meeting in their room at 32 Union Square.

At about 8:30 p. m. the temporary chairman, Mr. Haddow, in the absence of the president, Mr. Reama, called the meeting to order. Reports from the various committees were given and disposed of in regular order.

The subject for discussion at the meeting was "What Is the Best Brightener for Plating Solutions?" There were many and varied points and suggestions brought out, but no general opinion was reached on any solution with the possible exception of brass. Many agreed that brass could be brightened without any harmful results to the product by the addition of a very small quantity of arsenic to the solution. In the case of nickel it was suggested that, with a good plating solution, no brightener should be needed. In support of this point one member said he had used a solution for seven years, and had never found a brightener necessary.

A paper which gave several laboratory plating tests and conclusions was then read and discussed by sections.

The interest was continuous throughout the meeting, and the acting chairman found it necessary to ask for the motion to adjourn at a short while before 11 o'clock.

This branch of the society shows itself to be in excellent condition. It is in strong financial shape, and it was pointed out to THE METAL INDUSTRY representative that it now has considerable new laboratory equipment so that varied and somewhat extensive experiments can be carried on by the branch in its own quarters.

St. Louis Branch—F. C. Rushton, 4405 Blair avenue, St. Louis, Mo., secretary.

The regular monthly meeting was held March 17 in the Assembly room of the St. Louis Public library, at which the following chairman of committees for the 1917 convention made their reports. H. H. Williams, exhibit committee; E. J. Musick, entertainment committee; H. J. Richards, educational committee, and F. C. Rushton, also of the exhibit committee. After the reports had been read Mr. Rushton exhibited some samples of work that had been plated in hot nickel solutions made up from various formulas and run at different temperatures. The deposits on several of the samples had been obtained at from 5 to 15 minutes.

NATIONAL ELECTRO-PLATING ASSOCIATION

The electro-platers of Great New York have formed an association known as the National Electro-Plating Association. The objects for which this corporation is formed are to foster the business interests of its members; to procure uniformity in the job plating business; and also to take measures proper, necessary and suitable for the protection of its members against impecunious debtors. The following officers were elected for the ensuing year. Philip Seivering, president; William H. Flavin, vice-president; August Plumacher, treasurer, and Ernest Tillman, secretary. The following directors were also elected: Messrs. Landgraf, Gross, Trichlinger, Musante and Farrell.

BRITISH INSTITUTE OF METALS

TO THE EDITOR OF THE METAL INDUSTRY:

The spirit of the times is being reflected in the metal world by the increased membership in the various societies, the increase in both the quality and quantity of technical and scientific papers discussed at the meetings, and by the active interest taken by the societies in research and investigational work along metal lines. The British Institute of Metals, it can be stated, is active in all three lines, as is especially evidenced by the large and rapidly growing membership in that institute on this side of the Atlantic and by the valuable papers which are presented to the semi-annual meetings of the society. To the members come each year, two volumes of the journal which contain the papers presented and their discussions, lectures delivered before the institute, results of the investigational work conducted by the institute, and a complete bibliography of the contemporary literature, which is valuable for reference purposes. The interest shown in the scientific and technical fields of the non-ferrous metal industry will doubtless mean that other American metallurgists will desire to become members of the British Institute of Metals. The writer is authorized by the council to assist prospective members in the United States in becoming acquainted with the work of the institute, and he suggests that any such communicate with him on the subject of membership.

SAMUEL L. HOYT,
Corresponding Member to the Council for United States,
The Institute of Metals, London, England.

MARCH 10, 1917,
University of Minnesota
Minneapolis, Minn.

THE COMMERCIAL OUTLOOK—NATIONAL AND INTERNATIONAL

An Address Delivered Before the Editorial Conference of the New York Business Publishers' Association, March 20, 1917, by O. P. Austin, Statistician of the National City Bank of New York.

The time has come when we of the United States must begin to think seriously of the future of our trade. And in doing so we must give equal attention to the future of world trade, for our own commerce is so closely interrelated with that of the entire world that the prosperity of the one is dependent on the prosperity of all. True we have prospered by the conditions of the past two and one-half years, but we neither expect nor desire that these conditions will continue indefinitely.

POST BELLUM TRADE PROBABILITIES.

The first question to be considered in looking to the future of trade, national and international, is the probable condition in which the countries now at war will emerge from that great struggle and their prospective ability to resume their commercial relations with each other and with other parts of the world.

The second question to be considered is our own prospective relation to world trade, both with the countries now at war, and also with those sections in which we have been making material gains by reason of the inactivity of those accustomed to supply those fields.

Obviously the answer to the second question, as to our own trade after the war, must depend largely upon that which should be given to the first question, the prospect as to the commercial conditions in which the nations now at war will emerge from that struggle. Will they be willing to resume their trading relations with each other; Will they be able promptly to resume their commercial relations in other parts of the world? Will their demands upon us be normal or abnormal; and, if so, in what particulars?

TRADE CURRENTS NOT PERMANENTLY CHANGED BY THE WAR.

In my opinion international trade after the war will be quite similar to the international trade before the war. The great trade currents which have been developed in the century since the steam vessel and railway reconstructed the commerce of the world and multiplied its activities, are the result of natural conditions which cannot be permanently interrupted by even such a titanic struggle as that which we are now witnessing. Certain great sections of the world have become its chief producers and distributors of manufactures, and must so continue for many generations, while certain other sections have become and must continue to be the chief producers of foodstuffs and manufacturing materials. The trade currents established by the exchanges between these great sections must continue, while the exchanges between countries only separated by imaginary lines, and thus made at less cost than those with more distant countries, will speedily resume, both as a matter of convenience and business economy, and business, as you business men know, is little influenced by sentiments.

WHY NORMAL TRADE CONDITIONS MAY BE RESUMED.

Now let us consider some of the main reasons why, as it seems to me, we may expect a speedy return to practically normal trade relations after the war. The suggestion of the Paris conference that the war at arms should be continued commercially receives less and less of support as we find opportunity for reflection. Other suggestions, namely, that the countries at war will, immediately upon its termination, begin to dump accumulations of manufactures upon the markets of the world; that these countries will be short of certain classes of manufactures, and will call upon the United States for great supplies; that shortage of capital will prevent a resumption of their industries and export business; and that lack of shipping facilities will prevent a return to customary trade movements, appear likely to prove much less formidable when we come to face them than was anticipated when they were viewed from a greater distance.

TERMINATION OF HOSTILITIES A SIGNAL FOR TRADE RESUMPTION.

No feature of the relationship of countries or sections formerly at war has been more striking than the promptness with which their commercial and business relations were resumed at the close of hostilities. The war between the two sections of our own country in which the bitterness was great was followed by a rapid resumption of trade between the sections. The internal commerce of the United States amounted at the beginning of that war to approximately $3,000,000,000, and was by 1870, five years after its close, more than double that of 1860; the products of the two sections were freely interchanged and business relations promptly re-established.

Trade relations were quickly resumed between France and Germany following the war of 1870-71, in which the bitterness was quite as great as that which now exists. Imports of France from German territory in 1869, the year prior to that war, were $50,000,000 in value; in 1872, the year following the war, practically $70,000,000, and averaged $66,000,000 per annum in the five years after the war. German imports from France in the same period showed an even larger gain, having been in the year before the war $60,000,000, while the annual average in the five years following the war was $83,000,000. Thus trade between France and Germany showed an increase of 40 per cent. in the years immediately following the war.

The trade relations between the United States and Spain following our own war with that country, were promptly resumed and quickly increased. Our imports from Spain in 1897, the year prior to the war, were less than $4,000,000; and in the five years following that war averaged $6,000,000 per annum, an increase of 50 per cent., while our exports to that country which were $11,000,000 in the year preceding the war, averaged $14,000,000 per annum in the five years following the war, an increase of 25 per cent.

Japan's exports to Russia, which were about $1,500,000 in the year prior to that war, averaged more than $3,000,000 per annum in the five years after her war with that country, an increase of over 100 per cent. in a five-year period.

TRADE RELATIONS OF THE COUNTRIES NOW AT WAR.

No countries in the world are more keenly alive to the importance of commerce and to governmental co-operation therein than are those now at war, and it seems to me highly improbable that either their commercial or financial interests will enter upon or even permit a business war at the close of that now in existence. Great Britain alone sells in times of peace to the Central Powers about $400,000,000 worth a year of her products, and buys from them another $400,000,000 of merchandise which she MUST have, and which it is more convenient for her to purchase from that nearby territory than to bring at greater expense of transportation from other parts of the world. France sold to the Central Powers in the year preceding the war about $200,000,000 worth of merchandise, and bought from them $250,000,000 worth. Russia's exports to the Central Powers averaged $250,000,000 a year, and her purchases from them $325,000,000 a year. Italy's sales to them amount to $125,000,000 a year, and her purchases from them $175,000,000 a year. Belgium's imports from them amounted to $160,000,000 per annum, and her sales to them $220,000,000. Germany's imports from the Allies and their colonies amount to over a billion dollars a year, and her exports to them a full billion; Austria-Hungary's imports from the Allies are $600,000,000, and her exports to them over $500,000,000, while the trade of Turkey with the Allies is about $150,000,000, making the recorded trade of the Central Powers with the Allies about $3,000,000,000 a year; while the records of the Allies also show their trade with the Central Powers about $3,000,000,000. Of course this counts the merchandise twice, once when it is exported and again when imported; but this is true of all aggregations of world commerce, that the value of the merchandise is stated when exported and again when imported. Can we believe that 10 of the most alert commercial countries of the world are going to throw away opportunities to sell three billion dollars' worth of merchandise a year, or to buy that three billion dollars' worth of their requirements at less cost than they can bring them from more distant countries, merely as a result of conditions which have never before, in any part of the world, resulted in permanent interruption of trade relations?

INDUSTRIAL POWER OF BELLIGERENTS AFTER THE WAR.

What will be the industrial and therefore the commercial condition of the belligerent countries after the war? There are some who assert that their population will be greatly reduced as a result of the 4½ millions killed or fatally wounded up to this time. But those making this assertion forget, apparently, that the countries at war are constantly increasing their population; that there is in all cases, except that of France, a large excess of births over deaths, and thus a net gain in population. The annual net increase in population in recent years has been, in Russia 2,900,000, Germany 825,000, Austria-Hungary 403,000, Great Britain 393,000, Italy 362,000, Belgium 73,000, and France 64,000, making the annual average of net gain in population of the European countries now at war a little over 5,000,000 per annum. Of this number approximately one-half are males, and we may thus assume that the net increase in the number of male persons entering the industrial age, and thus available for industrial pursuits in the countries in question, is in the two and one-half years since the beginning of the war about 6,000,000, while the war losses by death and permanent disability, according to the latest computations, are but about 4½ millions. In addition to this it is a well-known fact that in all these countries the loss by emigration has been suspended, and that many of their former emigrants have been called home. Then, too, there have been in those countries large additions to the number of women employed in industrial and business pursuits. We may, therefore, safely assume that the countries in question, when they emerge from the war and return to the pursuits of peace, will find themselves with a materially larger industrial, and therefore commercial, element than they had at the beginning of the war. More than this, the industrial machinery has been speeded up to a much greater producing power than ever before. Of course a brief period will be required to transform their factories from those producing war materials to those required for peace. But the very facility with which we ourselves transformed our factories from those of peace requirements to those to be utilized for war illustrates the promptness with which the change can, and doubtless will, be made in the European countries upon their return to peace.

DESTRUCTION OF SHIPPING AND EFFECT ON WORLD TRADE.

As to the destruction of vessels during the war and its effect upon future commerce, the latest estimate of vessels destroyed is about 5 million tons, or about 10 per cent. of the world's total tonnage at the beginning of the war, but as it is asserted that the production of new ships meantime has been one-half as much as the tonnage destroyed, we may assume that the net loss thus far is not over 5 per cent., and that this loss unless greatly increased will be so evenly distributed in world trade as to be comparatively unimportant in the relative commercial power of the great trading nations.

WILL OUR MANUFACTURES COMPETE IN WORLD MARKETS.

Now as to the future power of the United States to compete in foreign markets in the sale of manufactures, which have been in the past chiefly supplied by the European manufacturers. It is asserted by some that the power through which Europe has supplied in the past $7,000,000,000 worth of manufactures entering international trade, while we were supplying $1,000,000,000 worth will be materially reduced by reason of a reduction in number of their workers, a reduction in the amount of capital available with them, an increased rate of interest which their capital must earn, and the greatly increased taxation necessary to pay interest on their national indebtedness, which now aggregates for the countries at war about $85,000,000,000, against $27,000,000,000 at the beginning of the war, and at materially higher interest rates. All of these reasons, as to the disadvantages under which European manufacturers will labor after the war, are worthy of consideration, except the unjustified assumption that the number of their workers will be less than at the beginning of the war. But on the other hand, we must, in attempting to determine our own power to compete in manufactures sent to foreign fields, take into consideration the fact that prices of raw materials and of labor have been with us enormously increased, and as a consequence there has come a corresponding advance in our own cost of production. To what extent we shall be able to return to normal conditions in cost of production of manufacture, either in prices of raw materials or wages paid, is a subject for the future, and one which will be extremely difficult to meet, since a reduction of wages will doubtless be more difficult than that by which the recent and very large advances have been made.

BELLIGERENT COUNTRIES PLANNING TRADE RESUMPTION.

Meantime the countries which were formerly our competitors in the world's markets for manufactures are planning fully to re-establish themselves. Great Britain, whose exports are in the midst of a great war but a trifle below normal, is establishing a foreign trade banking system similar to that which aided Germany in so rapidly building up her foreign trade; France has also sent out commissions to South America, Asia and the United States to plan the resumption and expansion of her trade with them; and Germany, if we may trust the reports from behind the veil of secrecy which now surrounds that country, is equally active in planning to re-establish herself in the markets from which she has been temporarily cut off.

OUR OWN TRADE AFTER THE WAR.

Now to consider our own prospects. If we are justified in assuming that world trade conditions are likely to resume normal or approximately normal proportions and methods after the war, and also justified in the hope that the end of that terrible struggle is not far distant, we must give immediate and serious attention to the future of our own part in international trade, and especially the question as to whether we are to be able to retain the increased share of the world's trade which we have accumulated during the war.

GAINS IN OUR SALES TO NEUTRALS AND BELLIGERENTS.

Have we increased our share in world trade during the war period? The answer to that question is obvious, for our exports in 1916 were 160 per cent. greater than in 1913, the year before the war, and our imports 33 per cent. greater than 1913, while total world trade in 1916 was probably about 10 per cent. greater than in 1913. While it is true that much of this increase in our exports occurred with the nations at war and consisted chiefly of munitions for which the demands upon us will cease at the termination of hostilities, it is also true that there was a large gain in the sales to the neutral world, and this consists almost entirely of a class of material for which we must continue to find markets abroad.

It is to these neutral sections and the increased trade with them that we should now be giving special attention. Our exports to the neutral countries of Eprope increased from $242,000,000 in 1913 to $402,000,000 in 1916; to South America, from $147,000,000 in 1913 to $220,000,000 in 1916; to Asia, from $126,000,000 to $205,000,000, exclusive of that going to Vladivostok for transmission to European Russia; to Africa, an increase from $29,000,000 to $54,000,000; to Oceania, from $82,000,000 to $106,000,000, and to North America, from $601,000,000 to $925,000,000. The total increase in exports to the neutral world was from $1,226,000,000 in 1913 to $1,911,000,000 in 1916, a gain of $685,000,000, while in the three years ending with 1913 the gain was but $416,000,000. The increase in exports to the neutral world in the three years ending with 1916 was 62 per cent. greater than that of the three years ending with 1913.

MANUFACTURES THE CHIEF HOPE OF OUR EXPORT TRADE.

But this is not all. The gain which we have made in our exports to the neutral world, $685,000,000, occurs in a class of merchandise which must be our chief hope in the future growth of our export trade. We have passed the stage in our industrial system in which natural products can form the chief share of our export trade. In the past, while we were making a phenomenal increase in exportation, the natural products, grains, meats and cotton were the articles in which the chief growth occurred. But within recent years we have reached a stage in national development in which we have no more of food stuffs to spare, and the share of our cotton which we require for local consumption is steadily increasing. As a result, we must expect that the chief gains in our exports in the future will occur in manufactures, and while we shall have a harder fight to develop an increased trade in manufactures than we ever had in selling the natural products, because of the sharp European competition which we shall encounter in manufactures, we must make that fight if we are to maintain our rank and prosperity as an exporting nation.

Nearly all of the $685,000,000 worth of gain, which we have made in the exports to the neutral world since the beginning of

the war has occurred in manufactures. And as a result the responsibility of retaining that gain and increasing it as the years go by must rest upon our manufacturers. To belligerent Europe there will also be opportunities in the first year or two after the war for sales of our manufactures, especially material for construction of new buildings and railways to take the place of those destroyed and the establishment of new factories, but this will be temporary, for manufacturing Europe will soon be able to supply its own requirements in this line, but in all the neutral world, North and South America, Asia, Africa and Oceania, the demand for manufactures will continue and increase with the general revival of business and industrial development which will come with a return to world peace. And it is to that field that our manufacturers should give their special and earnest attention, to retain the gains which we have already made, and increase them in the face of the vigorous competition which they must expect from those who have occupied that field in the past. And to do this successfully they must adopt the methods which have given our rivals success in that field, make the goods to suit local requirements and customs, and sell them upon the accommodating terms to which the people of those countries have been accustomed for generations. While this may require additional capital, the present plentiful supply of this factor should encourage them to enter seriously upon the work of holding and greatly enlarging their present share in the trade of the world, and especially those countries in which manufactures form the chief imports.

NEW OPPORTUNITIES IN THE TROPICS.

Just one word more. There is a great section of the world yet undeveloped in its producing power, and therefore its purchasing power, and it is a field which the experiences of the war have shown us a practical method of development. By this I mean the tropical world. That great belt stretching around the globe in the vicinity of the equator is the section of the world which has been least developed in its production, although its producing powers are greater for a like area than that of the Temperate zone in which most of the world development has occurred. Between the 30th parallel of North latitude, which

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

C. F. Loeble, formerly chemist for the United Smelting & Aluminum Company, New Haven, Conn., is now chemist and metallurgist with the Girard Smelting & Refining Company, Philadelphia, Pa.

A. B. Seelig, for many years connected with the Chase Rolling Mills, of Waterbury, Conn., as secretary and general sales manager, was recently elected general manager and one of the directors of the Bristol Brass Company, Bristol, Conn.

H. H. Reama has become connected with the Oakley Chemical Company, manufacturers of Oakite cleaning compounds, New York, and will act as their "trouble man," specializing in the plating trade, wherever difficulty is encountered by any of the representatives of the company.

DEATHS

FERDINAND WILLIAM ROEBLING

Ferdinand William Roebling, secretary-treasurer of the John A. Roebling's Sons Company, builder of the Brooklyn bridge and other large structures, and also president of the Trenton Brass & Machine Company, died at his home in Trenton, N. J., March 16, at the age of 75 years. Mr. Roebling was born in Saxonburg, Pa., and was one of the four sons of the John A. Roebling, who was the pioneer in the manufacture of wire rope in this country, establishing his plant in Saxonburg in 1840, and in 1848 moving the works to Trenton. Upon the death of his father, Ferdinand Roebling took over the executive management of the concern, leaving the technical work to his brothers, and was largely responsible for its great expansion. He was a graduate of the Polytechnic College, Philadelphia, Pa., where he specialized in chemistry. He is survived by three brothers, two sons and two daughters.

F. W. ROEBLING.

GEORGE ANDERSON

On March 20 the rolling mill department of the Scovill Manufacturing Company, Waterbury, Conn., suffered a loss through the death of George Anderson, who was superintendent of that department. Mr. Anderson entered the employ of the Scovill company in 1900, and was fifty-two years of age at the time of his death. He had been the superintendent of the rolling mill for only a few years before his death, earning his way to that position by a combination of ability and personality. At the time of formation of the Foremen's Association of the Scovill company, Mr. Anderson was chosen a member of the original executive committee because it was known that he possessed good judgment, power and practical foresight.

GEORGE ANDERSON.

Otto Rudd, second vice-president and general manager Simmons Company, Kenosha, Wis., died at the Mayo hospital, Rochester, Minn., March 2, aged forty-eight years. Mr. Rudd only recently had been promoted to the general management of the company in recognition of his genius in the development of tubing for the manufacture of beds and as a production expert. He was born in Sweden, and came to America when eighteen years old, beginning his career as a track laborer in Minnesota. He entered the employ of Z. G. Simmons, brass bed manufacturer, at Kenosha, as a common laborer, and at his death was in receipt of a salary of $25,000 a year. He leaves a widow and two daughters.

M. Aronson, president of Shapiro & Aronson, manufacturers of lighting fixtures, New York, died March 13, at the age of 46. Mr. Aronson was one of the pioneers in the lighting fixture industry.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW BRITAIN

April 2, 1917.

War, preparedness, what local concerns could do in case of actual hostilities and active preparations for the protection of local industries is the thought foremost in the minds of New Britain's manufacturers and workingmen. General business conditions are very good, as they have been for the past few months, but the grave uncertainty of the present day is by far the most important factor in the minds of the big concerns. For more than a month past practically every concern of any size at all in this city has been closely guarded night and day, but particularly at night when armed men take all precautions against the possible attack of an incendiary or other hostile classes. Strung about the outside walls and across the yards of the big shops are hundreds of incandescent lights, which burn brightly from sunset until sun-up, and on the New Britain Machine Company's plant three large searchlights have been mounted, lighting up the factory yards and the adjoining street and railroad siding. That all these precautions for the protection of industry here is not the result of a hysterical fear was proved on the night of March 21, when an armed guard at the Traut & Hine Manufacturing Company's plant detected a marauder sneaking about the factory yard. Although the alleged spy escaped, in so doing he dropped a paper on which, it is reported by certain officials, was written the names of the big plants here together with an elaborate code index system, thought to be a key to the cipher map. This document, officials claim, not only gives a technical description of local factories, but also contains some detailed information, such as exits, railroad spurs, etc.

In the event of war the part that the New Britain factories would play is somewhat problematical, but of course it could not be compared to Waterbury, New Haven or Hartford, with the Scovill Manufacturing Company, the Winchester Arms Company, the Colt's Arms Company and other munitions plants such as the Remington Arms Company, of Bridgeport, Conn. New Britain could, however, furnish a large amount of auxiliary work. The New Britain Machine Company could turn out special machinery. The P. & F. Corbin shop and the Russell & Erwin shop could turn out sub-contracts on certain parts of munitions as they have done in the past for the American Can Company. The Stanley Works, too, could turn its energies to certain parts of the munitions or semi-munitions business. Its biggest assets, possibly, would be its cold rolled steel mills. The North & Judd Manufacturing Company is noted for its saddlery products, and could turn out unlimited quantities of army accoutrements, as could the Traut & Hine Manufacturing Company. Put to the test other concerns, large and small, could furnish their "bit" for Uncle Sam. Thus it is imperative that each plant be closely guarded.

An important manufacturing deal has lately been consummated whereby Allan J. Beaton has retired as president of the Beaton & Cadwell Manufacturing Company. This concern is one of the most prosperous in the city, and one of its chief output is hot air registers. William H. Cadwell, secretary and treasurer of this company, has taken over Mr. Beaton's interests. Work on a new seven story concrete factory addition for this concern is nearing completion, and when finished will be one of the most modern plants in the state. Mr. Beaton is considering the advisability of opening a new concern under his own management. If his plans materialize it is likely that it will be in the same line of business. Work on a new $50,000 building for the Stanley Works is also progressing.—H. R. J.

PROVIDENCE, R. I.

April 2, 1917.

The end of the first quarter of the new year finds the various metal trades in about the same condition that they have been for the past two years or more, the European war demands having been in a measure caught up with, but the outlook, with the possibilities of the United States entering the great conflict, once more crowds the situation.

The same handicaps follow the metal industries that have been in evidence throughout the entire rush period—the shortage of help and the demand of the buyers for goods faster than the plants can produce them. The industry, as a whole, is employing at the present time more than 50 per cent. more persons than in normal times, and many of the manufacturers are wondering how they are going to keep on accepting orders if they cannot obtain more employees to turn them out. The reports from the majority of the plants show that they have orders booked up for many months to come. The jewelry trade has been securing a good share of business so far this year and many of the factories have been working on overtime schedule in order to meet the demands for the goods that are needed. Following an exceptionally good holiday trade, manufacturing jewelers have continued on a satisfactory basis, and the present outlook is especially encouraging for the balance of the year.

The Eastern Foundry Supply Company, 75 Westminster street, has discontinued business.

J. L. Anthony & Company, platers at 161 Dorrance street, have recently added another floor to their plant, so that their facilities for turning out plated stock and wire have been more than doubled. New machinery has been added, and in other ways the firm is showing evidences of growth.

Thomas Shaw and Frederick L. Cleveland, of Woonsocket, and George W. Greene, of North Smithfield, have incorporated a company under the laws of Rhode Island as the Simplex Tool Company, with capital of $50,000, to do business in Woonsocket as manufacturers and dealers in tools and machinery.

The Standard Nut & Bolt Company, of Pawtucket, has filed a certificate with the secretary of state, showing that it has increased its capital stock from $100,000 to $200,000.

A charter has been issued under the laws of Rhode Island by the secretary of state to Edgar M. Doherty, of Cranston; Frank M. Budlong, of East Providence, and George W. Bugbee, of Cranston, in the name of the William C. Greene Company, with a capital stock of $50,000, to do a general jewelry business with headquarters in Providence. These incorporators have been conducting the business for some time as co-partners.

William H. Saart, of Attleboro, Mass., and Francis J. McCanna and Benjamin H. Jackson, of Providence, have been granted a charter as the Amergold Company, Inc., with a capital of $50,000, all of which is common, to do a general manufacturing jewelry business in this city.—W. H. M.

BOSTON, MASS.

April 2, 1917.

Local manufacturers and houses breathe somewhat freer now that the threatened national railroad strike has been averted. The car shortage before the negotiations began was bad enough, but a national tie-up would have spelt disaster to some of the concerns in this state. But the storm has passed, and while there is some little anxiety in some quarters because of war's alarms, the situation throughout the state is good, and all signs point to a gradual betterment during spring. Virtually the only question that is troubling manufacturers, in the event of war, is whether they can get enough raw material. They do not doubt for a moment that prosperity will be continued, even augmented, but they fear that shipments will be held up by government and military trains. The metal market is already being affected by government purchases, which are increasing in volume and interest. Structural needs of the government in sight amount to more than 25,000 tons of fabricated shapes for arsenals, navy yard improvements, etc.

In this direction it may be said that several of the local manu-

facturers have placed their plants at the disposal of the government, if it should need them, but so far none has been notified to this effect.

It is reported that men connected with Goldsmith, Stern & Company, smelters, assayers and diamond importers, and manufacturers of gold and platinum jewelry, are to open a branch factory in Attleboro, Mass. At present the company is located at 22 to 34 Gold street, New York. The concern will employ 350 or more. It will locate in the Makepeace building and the work of making the factory space ready has been going on for some days.

The old metal market eased off a bit during the last week with the report that the producers of copper had volunteered to supply the government with all the copper they required at about 16¾ cents a pound. The old metal dealers are a little at sea as to just what the effect of this proposition is going to be on the market. It is understood that some of the large New York operators consider that there is nothing in this proposition to worry the dealer in scrap metal, neither is there any reason to believe that the market will decline. Nevertheless in the local market dealers have been more careful as to what they paid for the red and yellow metals, and in most cases they cut their offering prices to the extent of at least a half cent a pound. In white metals the situation is very similar to what it was a few weeks ago, except that lead seems to be easier and dealers are chary about offering much over 8¼ cents for lead. The demand for aluminum continues very good, and both mixed cast and sheet aluminum clippings are holding firm at prices quoted a week ago.

The annual election of the Boston branch of the Metal Trades Association was held at Young's Hotel, March 7, representatives from all parts of the state being present. Following the election of officers a banquet was given. W. R. Balch, of the Boston Transcript war department, gave an interesting lecture on the war. The officers chosen for the ensuing year were: President, Robert G. Morse; vice-president, Frank Burgess, Boston Gear Works, Norfolk Downs; treasurer, Winslow Blanchard, Blanchard Machine Company, Cambridge; secretary, Donald Tulloch, Jr., Pittsfield. Executive committee: H. W. Woodworth, American Tool and Machine Company; M. B. McLaughlin, George T. McLaughlin; Albert C. Ashton, Ashton Valve Company, Cambridge; B. T. Williston, United Injector Company; Fred F. Stockwell, Barbour & Stockwell Company, Cambridge. Out-of-town guests included: H. H. Rice, Waverly Company, Indianapolis, Ind.; Murray Shipley, Lodge & Shipley Machine Company, Cincinnati, Ohio; A. E. N. Beaman, Stockbridge Machine Company, Worcester, Mass.; H. W. Kennedy, Hoggson & Pettis Manufacturing Company, New Haven, Conn.—R. T. E.

ROCHESTER, N. Y.

April 2, 1917.

There is little or no change in the metal situation in Rochester and vicinity. At the regular monthly meeting of the Rochester Purchasing Agents' Association word was given out that "trade was never so good, prices are working somewhat higher, metals in many respects are in an easier position, and we are following a policy of 'watchful waiting.'" The announcement of the agents apparently sums up the local conditions in a few words.

All of the leading manufacturers of this city, using large quantities of copper, brass and other metals, report high-tide prosperity. Practically every concern in the city is pressed to its utmost, and some are turning away orders. This is true particularly in copper and brass lines.

Rochester interests are looking forward with much anxiety to a real peace movement in Europe within six months or well toward the end of the present year. It is believed that so soon as hostilities cease, prices of all standard metals will undergo a great recession. It is realized, though, that the recession will not be permanent, but that the six months or more of lower prices will enable the country to restock and get itself in a better position to meet new conditions arising from the tremendous demand that will follow the reconstruction of Europe.

Rochester firms have not announced any unusually large orders during the past month. Brass is ruling higher in the local market, both heavy red and light yellow. Copper is strongly held. Zinc is higher and in greater demand. The market for aluminum is practically stationary, with an easier tone. There is a very little demand for antimony at this time.

The most interesting announcement in local manufacturing circles during the past month is that of the Eastman Kodak Company. The concern has finally perfected an airplane camera, a device that will enable an aviator, at an altitude of from 3,500 to 4,000 feet, to snap a picture of objects on the earth while flying at a speed of 85 miles an hour. The final tests were made at Pensacola, Fla., and in consequence the War Department has ordered 100 of the new devices. The exterior of the airplane camera, which is almost small enough to carry in one's overcoat pocket, is constructed of sheet aluminum, nickel, brass and copper bands.—G. B. E.

CLEVELAND, OHIO

April 2, 1917.

The B. M. Gardner Company, one of the largest dealers in copper and brass products in northern Ohio, and mill representative of out-of-town firms, has increased its capital stock to $50,000. With this increase comes further expansion of the firm. A Detroit, Mich., branch has been established at 704 Ford building, where C. E. Conover, vice-president of the company, is now in charge. C. L. McMaster has been elected secretary, and will have charge of Cleveland sales. To care for its increasing business in this territory, the Gardner company has leased larger quarters in suite 321 New Guardian building.

Another great factory for Cleveland is also planned, as seen in the statement of Kenneth Sturgiss, secretary of the Industrial Development Committee of the Cleveland Chamber of Commerce, who has just returned from Detroit, and who says he has received assurances from the J. W. Murray Manufacturing Company that it expects to form a $500,000 Ohio corporation, with headquarters in Cleveland, for the production of automobile parts. The specialty of the proposed company will be parts in which sheet metal is used, notably, hoods, fenders, drip pans, tanks and the like. Outlet for these products is seen in the statement of motor car producers in Cleveland that the production of automobiles in this city now is near the 100,000 mark.

Mystery over the disappearance of huge quantities of copper, lead and other metals shipped into Cleveland, has been set at rest by the taking into custody of four well-to-do business men of Cleveland. The arrests disclosed robberies involving $500,000 worth of metal, and which extended over a period of two years. The men taken are declared to be the leaders of a gang that systematically robbed cars in the yards here. Practically all the goods stolen were metals. The men arrested are claimed by detectives to have been receivers for the stolen material, which was remelted into different shapes and then disposed of. The quartette was taken in charge by federal inspectors, and later released on bail, $7,500 each.

Acquisition of an acre of ground in the Berea Road section by the Empire Brass Manufacturing Company will now permit the erection of a $20,000 factory building, plans for which already have been prepared and which is expected to be completed by May 1.

The first brass and copper mill for the state of Ohio will be in operation in three or four months, following the organization of a million dollar corporation here. The project is considered the most important in the metal industry in recent years. The new company, to be known as the Cleveland Brass & Copper Mills, Inc., includes in its directorate prominent men in the industry and Cleveland capitalists. The company has been capitalized at $1,000,000 preferred stock, and 10,000 shares non-par value common stock.

Contract for the plant has just been awarded to the Westinghouse Church Kerr Company, New York City. Within a few weeks construction on a brick and steel building occupying a plot 250x450 feet, on acreage at Babbitt Road and Nickel Plate R. R. tracks, will begin. The equipment will be the most modern in the country for the purpose. Machinery will be supplied by A. Garrison Foundry Company, Pittsburgh; Torrington Manufacturing Company, Torrington, Mass.; W. S. Rockwell Company, New York City. All forms of rolled and drawn brass and copper products will be produced.

Officers of the new company are: President, Henry C. Osborn, of the American Multigraph Company; vice-president, B. F. Brusstar, head of the Michigan Copper & Brass Company, Detroit; secretary, B. M. Gardner, head of the B. M. Gardner Company, Cleveland; treasurer, H. P. McIntosh, Jr., of the Guardian Savings & Trust Company.

Activities in connection with the sheet metal industry by union labor interests are claimed to be the basis for the lockout of certain factions of union laborers by the Building Trades Employers' Association, a group of building contractors. The controversy has been pending nearly four weeks now. The trouble is claimed to have originated at the new plant of the Ohio Blower Company. This firm, according to union headquarters' officials, has refused to unionize its sheet metal workers, and should do so because the workers happen to be helping to produce an air washing machine that union labor was instrumental in having installed in factories through state legislation. Following the lockout union officials called a strike upon other jobs, and yet they claim the strike was not caused by the refusal of the Ohio to unionize its shop, but because that firm refused to negotiate with the main union body, the Building Trades Council.—C. C. C.

COLUMBUS, OHIO

April 2, 1917.

While the metal market in central Ohio territory is slightly less active than formerly, prices are generally well maintained. There is a good demand for most metal-using concerns and supplies are not as large as formerly. The worst feature at this time is the railroad congestion and car shortage which are holding up shipments to a large extent.

The war situation has not changed the metal market to any appreciable extent. The announcement that metals are to be sold at cost to the government in case of war has the tendency to keep down quotations in every field. A few metal-using concerns have been organized in Ohio and this is expected to increase the consumption to a marked degree.

Brass is in fairly good demand and the market remains strong. Red brass is selling around 26¼ and yellow brass around 20½ cents. Copper is in fairly good demand, also, and is selling at 33 cents. Aluminum is unchanged from the previous week and is quoted from 52 to 53 cents. Zinc and tin are also strong. One of the strongest features of the trade is the demand for babbitt and type metals, which is brisk in every locality.—J. W. L.

CINCINNATI, OHIO

April 2, 1917.

The prospect of the United States becoming actively involved in the European war, with the resultant need of munitions and equipment of various kinds, has given a stimulus to the metal industry which was not actually needed, but which has served to restore something resembling the activity which reach its height about a year ago. It seems fairly certain that the demand for machinery and tools, with their call upon the metal market and the foundries for materials, will be extremely heavy, unless the threat of war should end in some manner now entirely unexpected. In addition to this, the demand for various metal goods from mercnatile lines, such as the building trades and the plumbing industry, is at its height, with the spring building season just ahead; so that on the whole there were never better prospects for activity and prosperity before the metal trades than at this time.

This may readily be gathered from the amount of new building which has been done among the machinery concerns and by the brass foundries during the past year, together with that which is now being planned. Considerably more extensions have been made than in any two years before, putting it conservatively, and at the present rate of business increase many concerns which have not yet had to expand will be forced to do so during the current year, in order to handle their business.

The Champion Tool Works, one of the leading machine-tool manufacturers in the Cincinnati district, has filed application for a permit for a machine shop at its big plant on Spring Grove avenue, to cost $50,000 and which will measure 155 by 303 feet.

The annual dinner of the Metal Trades Association of Cincinnati was held at the Business Men's Club on the evening of March 1, with an attendance of eighty members and guests. The entire staff of officers was re-elected, in tribute to the fine administrative work done during an unusually trying year. The officers are: President, August Tuechter; secretary, R. K. Le Blond; treasurer, William Emmes; executive secretary, J. M. Manley; directors, M. Shipley, J. B. Doan and E. A. Mueller.

The Edna Brass Works, which has already added a handsome building to its plant in the past year, will shortly build a two-story machine shop, 100 feet square, to take care of its needs, it is understood.

Litigation is in progress in the United States District Court, at Cincinnati, between the Stanley Manufacturing Company and J. B. Grimes, C. E. Cox and W. C. Cron, doing business as the Globe Metal Label Company. The Stanley company alleges infringement of its patent covering improvements in the manufacture of metallic labels, emblems, and similar products, while the defendants allege that the patents are void for want of originality, declaring that the so-called improvements are covered in inventions said to have been made by George Moser, of Ludlow, Ky., several years before the application for the patent in controversy.—K. C. C.

DETROIT, MICH.

April 2, 1917.

The shortage of coal dominates the industrial situation and there is slight relief in sight after some great efforts that have been made by the railroads to improve manufacturing conditions during the latter part of the month. A serious tie-up threatened the factories here during the middle of the month, to say nothing of the inconvenience to the public at large.

The shortage of coke is also serious and promises to develop into an actual famine if drastic steps are not taken to relieve the situation. The shortage is seriously curtailing the operations of brass foundries and rolling mills which is reflected in a decreased production.

The possibility of the breach widening between the United States and Germany has been reflected in the metal markets during the latter part of the month. The likelihood of increased demand for war materials has had a tendency to hold prices firm.

The National Brass Company, Grand Rapids, Mich., has increased its capital stock from $200,000 to $275,000. The company manufactures a full line of brass trimmings and hardware used on furniture.

Business is still rushing in the brass manufacturing plants along the Canadian border and they are all extending their plants to meet the heavy contracts that have been secured by them from the Imperial Munition Board.—W. B.

LOUISVILLE, KY.

April 2, 1917.

Louisville coppersmiths are fairly busy on commercial work of one kind or another, but there is absolutely no distilling work to be had. High grain and coal have even stopped the alcohol manufacturers, and these conditions coupled with the prohibition movement have forced the beverage distillers from the field for the balance of this season at least. However, machinery manufacturers are good and busy, and are buying castings and metal goods at a lively rate, pattern making also being unusually good.

The metal market has held fairly steady throughout the month, very few changes being noted. Copper is scarce and high, and the demand is generally for immediate delivery and use. Ingot copper is quoted at 33@35 cents. Sheets, 44 base and up; and tubes at 50 cents base and up. Light colored, light weight scrap brass is selling at 16 cents and up, while heavy red brass is commanding as high as 25 cents.

The J. V. Pilcher Manufacturing Company is dissolving as a corporation, and will be conducted under the old name by J. V. Pilcher. The company manufactures brass and other metal buttons.

The Indiana Brass Company, of Frankfort, Ind., has filed notice of the dissolution of the corporation.

Hines & Ritchey report that they are very busy manufacturing milk machinery, in which they are using large quantities of silver-

bronze, which is non-corrosive metal and ideal for such work.

The high wages being offered by the Federal government for brass moulders, machinists, etc., in naval construction work, is expected to result in a shortage of labor in this vicinity. So far the copper workers have managed to get plenty of men.

The Belknap Hardware & Manufacturing Company, large jobbers of plumbing supplies and finished metal goods, has filed amended articles of incorporation, increasing the capital to $4,000,000. The amendment is signed by William Heyburn, John Price and others.

John S. Prinz has been appointed foreman of the new brass and general foundry and machine shops of the Vogt Brothers' Manufacturing Company.

The Clarksville Foundry & Machine Company, Clarksville, Tenn., capital $10,000, has been incorporated by T. B. Foust and others.—O. V. N. S.

TRENTON, N. J.

APRIL 2, 1917.

After having been closed down but a short time after completing large orders of ammunition for the Allies, the Standard Fuse Corporation will again start up its plant at Bordentown, N. J. A large order has been received from the Federal government and this will keep the works running for several months to come. About 500 hands in two shifts will be given employment at the start. The corporation formerly employed nearly 1,000 hands. The concern took over the Rice Gas Engine plant along the Delaware river and later built an addition and equipped it with expensive machinery. Good wages were paid the men and young women. When the plant closed the majority of the employes left for employment at other ammunition plants. It is now believed that the company will experience difficulty in securing enough help. Two officers of the state military forces visited Bordentown recently and selected a camp site for a detail of soldiers who will guard the plant, patrolling it on all sides night and day. The officers selected as their site a vacant lot on the Goodwin property, which faces the ammunition plant. The Bordentown plant was the first in the country to successfully manufacture fuses to meet the requirements of the Allies. Since the completion of its contracts only the machine shop forces were employed to turn out machines for other fuse plants.

Plants engaged in the manufacture of metal goods continue busy after a successful winter. The Skillman Hardware Manufacturing Company, besides turning out various kinds of hardware, is busy with orders for brass locks. The amount of permits issued for buildings for the coming spring and summer encourages the manufacturers and a good season is expected. The outlook last summer was not so encouraging until the season had become pretty well advanced. During 1916 there were 1,276 buildings erected in Trenton alone and this year promises to go beyond that record. Big additions are planned for some of the manufacturing plants. The Ingersoll-Trenton Watch Company some time ago decided to erect a good-sized addition this spring. The company is very busy at the present time.

The John A. Roebling's Sons Company is busy in its copper department and is turning out many copper conductors. Work is progressing on the new plant of the Westinghouse Lamp Company on Pennington avenue. Three shifts of men are employed, and with operations continuing night and day it is expected to have the mammoth plant completed by early summer. The new plant will cost $285,000 and will give employment to several hundred men. The New Jersey Chemical Company, which is producing zinc oxide for many industries, contemplates enlarging its plant on North Willow street.

The Jordan L. Mott Company is busy in its various departments aside from manufacturing munitions. Work is being pushed on the contract for making time fuses, and additional help is being engaged to have the order completed in time. The Billingham Brass and Machine Company is running full handed and has plenty of work. The other local metal plants also report being busy.

The Standard Fuse plant at Paulsboro, N. J., is very busy at the present time, and there is a big demand for help. While male help is desired at all times, young women are also wanted. The large boarding house of the company is to be enlarged and a number of new employes will make their home there. Many of the young women workers are averaging $12 to $18 a week. These include many who gave up their positions as stenographers in offices in Philadelphia, Wilmington and Trenton.

Fifteen employes of the finishing department of the Ingersoll-Trenton Watch Company went on strike recently following a dispute over their work and a request for more money should their work be more closely inspected. George F. Eberhard, general manager of the Ingersoll plants, said that 15 of the employes of the finishing department had their attention called to the fact that their work was not up to the standard. They were requested to be more careful with their work when they demanded more money. The men then went on strike. The employes of the finishing department are paid big wages and work piece-work. It is said that the inspectors found their work was not properly done, and that it could not be passed to the timing department.

The Jersey City Watch Company wired here for the strikers to accept positions at its plant, and some of the men went to that place. The remainder, it is said, are trying to get their old positions back. One of the strikers had been employed at the Trenton plant for 25 years. The strike has not affected the operation of the works, and the places of the strikers will gradually be filled.—C. A. L.

CHICAGO, ILL.

APRIL 2, 1917.

All lines in the metal industry continue in a prosperous condition, and owing to the probability that the productive facilities of the metal working plants will be called upon in the near future for the production of war material has stimulated business greatly.

The metal market is in an unsettled condition, but comparatively firm. Copper and lead were higher this month, but the general market conditions were steady for scrap metals.

Shipments and material is not causing the anxiety of the previous month, and the railroads have now lifted the embargo on all freight going east.

The National Association of Brass Manufacturers held their spring meeting at the Congress hotel, 28th and 29th of March, with a large attendance and some important business along the lines of finding out the actual cost of manufacturing was discussed. The meeting adjourned to meet in Cleveland for the regular midsummer meeting.

The Imperial Brass Manufacturing Company, located at Harrison avenue and Racine street, is running to its full capacity, making a general line of automobile specialties in brass and the imperial oxy-acetylene outfits.

The Bastian Blessing Company, 125-31 West Austin avenue, manufacturing a line of soda fountain supplies and general line of brass goods, are doing a nice line of business.

Chicago is a great center for the manufacture of automatic vending machines, and metals play an important part in their manufacture.

The Mills Novelty Company, one of the largest concerns in the country, and which ships its products all over the world and has a national reputation, is very busy at present and developing new machines. It is located at 231-235 South Green street.

The job plating shops are all doing a good business at present.

A new concern was recently incorporated under the name of The Globe Plating & Manufacturing Company. Capital stock, $2,500. Incorporators are: Albert C. Ferguson, Edward L. England, Guy L. Eames.

A new company incorporated under the laws of Illinois is the Mid West Brass Manufacturing Company, which will make plumbers' brass goods and specialties. This company has been organized with Peter W. Blair, formerly connected with the Mueller Manufacturing Company, Sarnia, Ont., Canada, as president, and Joseph F. Berthold, formerly secretary and treasurer of the Biever Manufacturing Company, as secretary and treasurer. The company has taken over the equipment and plant formerly operated by the Biever Manufacturing Company of North Aurora. The Mid West company operates a foundry, brass machine shop and plating and polishing department.—P. W. B.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

Lew W. Spaulding, manager of the Lewiston Iron Works, Lewiston, Mont., is contemplating the addition of a small brass foundry to his works.

The Rome Manufacturing Company, manufacturer of brass goods, Rome, N. Y., is having preliminary plans drawn for a two-story factory building, 50x310 feet, and a two-story office building, 60x110 feet.

The United States Metal and Manufacturing Company, Plainfield, N. J., has filed a certificate of dissolution in the office of the Secretary of State, Thomas F. Martin. This action was taken at a meeting of the stockholders.

The New York Hagerstown Metal Stamping Company, Hagerstown, Md., advises that recent reports of contemplated extensions to its plant are incorrect as the company at the present time has a large surplus of floor space, which is not in use.

The West Bend Aluminum Company, West Bend, Wis., manufacturers of kitchen utensils and sheet aluminum goods, is considering the erection of additions to its plant. It has leased the buildings it originally occupied for storage purposes.

The E. R. Wagner Manufacturing Company, manufacturers of hardware specialties and electro-platers, is enlarging its electric motor and general equipment. The company operates a tool room, stamping, tinning, plating, polishing and japanning departments.

The Mott Sand Blast Manufacturing Company, manufacturers of complete sand blast equipment, New York, is now located in its new plant in Brooklyn, N. Y., which has been especially fitted up with facilities for manufacturing sand blasts and allied equipment.

The Rome Hollow Wire & Tube Company, manufacturers of seamless brass and copper tubes, has increased its capital stock from $100,000 to $200,000. This company states that the published report that it would construct additions to its plant is incorrect.

The Edna Brass Works, Cincinnati, Ohio, will make an addition to its plant on Reading Road at an early date. This company operates a brass, bronze and aluminum foundry, smelting and refining department, brass machine shop, tool and grinding room and casting shop.

The Maryland Tube Corporation, Baltimore, Md., has awarded the contract for a tube, bar and sheet mill and brass foundry in South Baltimore. This company also operates a bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop, brazing and polishing departments.

The American Magnesium Corporation, recently incorporated with a capital stock of $600,000, has established a plant at Niagara Falls, N. Y., and is now producing magnesium ingots. I. R. Edmands is president, E. S. Whitney and George O. Seward are vice-presidents, and D. Burgess secretary and treasurer.

The report that the Aluminum Goods Manufacturing Company, of Manitowoc, Wis., is contemplating the establishment of a branch plant employing 200 workmen, in Sheboygan, Wis., is stated to be incorrect. If they build anywhere it will be either at Manitowoc, Wis.; Newark, N. J., or Two Rivers, Wis., where they now have plants.

The Musick's Plating Works, the largest and oldest job plating concern in and around St. Louis, Mo., has just closed a ten-year lease for a new one-story factory building to be erected at 915-919 Chestnut street, which they expect to occupy by May 15. New equipment will be installed and the building will be of modern design to permit of the highest degree of efficiency among the employes.

The best information obtainable is that the International Nickel Company, New York, has advanced the price of nickel about 10 cents per pound, the new quotation being 45 cents per pound. This level will rule generally on all contracts to be made from this time on, and although theer is likeley to be some deviations, any change will be governed by the amount of the metal taken and the deliveries wanted.

The Navy Department of Washington, D. C., opened on April 6, bids on the following schedules: 759, 760, 760½, 761, 762 and 763. These schedules were six in number, and among the materials that were specified were manganese, phosphor and torpedo bronze, brass and copper tubing; sheet and strip brass, brass cocks; bar copper, voice tubing; brass, manganese and phosphor bronze, copper; brass and copper pipe and tubing; pipe fittings, values, etc.

The Standard Brass Casting Company, Oakland, Cal., has installed several new brass finishing lathes, and expects to put in some more in the near future. The company now has a complete electro plating plant in operation, which enables them to more largely enter the manufacturing of brass specialties. Besides a plating department the company operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop and polishing department.

In accordance with votes of the stockholders of the Chase Metal Works, Incorporated, passed at a special meeting of the stockholders of the company, held January 16, 1917, papers have been filed with the secretary of state at Hartford and the town clerk at Waterbury, continuing the operation of the mills in Waterville under the name of the Chase Metal Works, and making the name of the company owning this and other interests, The Chase Companies, Incorporated.

The Trautz Company, refiners of gold, silver and platinum, Newark, N. J., is building a new plant located at 10 and 12 Delancey street, for the smelting and refining of all kinds of material bearing gold, silver and platinum, and which will have a capacity of 5 tons daily. The firm name of the Trautz Company after May 1, 1917, will be changed to the Trautz Refining Company, with an authorized capital stock of $50,000. The officers of the company will be Charles C. Trautz, Sr., president; August L. Trautz, treasurer, and William E. Trautz, vice-president.

The D. Nast Machinery Company, Bourse building, Philadelphia, Pa., announces that one of its clients is in the market for the following equipment for a brass and copper rolling mill: One 22x36-inch single breaking down mill with two-speed drive and arranged, if possible, for changing to double mill later on; one 20x28-inch double running down mill with one-speed drive and coiler; one 16x30-inch double finishing mill with one-speed drive, two coilers and two blockers; two 12x18-inch single finishing mills; one heavy slitter with scrap cutter, one five-roll heavy straightener, one nine-roll light straightener and several sizes of alligator shears.

To supply the necessities of the government, and to relieve a situation which was hampering and threatened to strangle work of military preparation, the firm of J. P. Morgan & Co. has agreed to advance up to $1,000,000 for indefinite term upon security that has been refused by every bank to which it has been offered. This action was taken by J. P. Morgan & Co. at the solicitation of Edward D. Page, chairman of the New York committee, appointed by the Chamber of Commerce of the United States to co-operate with the depot quartermaster of the War Department and Colonel J. M. Johnston, Jr., in the purchase of supplies for the United States army. Mr. Page, who is one of the directors of the Merchants' Association, is giving all his time to the work.

The Cleveland Brass & Copper Mills Company, Cleveland, Ohio, has placed a contract with the Westinghouse, Church, Kerr & Co., New York, for five buildings, which will be completed about July 1, 1917. The buildings will include a casting shop, rolling mill, boiler house, ware house and coal and coke storage buildings, and the principal product of the company will be brass and copper, rolled and drawn. Henry C. Osborn, president American Multigraph Company, is president; B. F. Brusstar, formerly general manager of the Michigan Copper & Brass Company, Detroit, Mich., is vice-president and general manager; B. M. Gardner is secretary and sales manager, and H. P. McIntosh, Jr., is treasurer. The directors of the company are: J. H. Foster, N. M. Gardner, C. R. Hamilton, J. H. Harrison, J. A. House, H. P. McIntosh, Jr.; S. H. Moore and H. C. Osborn.

The Brown's Copper & Brass Rolling Mills, Ltd., New Toronto, Ontario, Canada, announces that they have awarded a contract to the Southwark Foundry & Machine Company, Philadelphia, Pa., covering the installation of a 2,000-ton hydraulic extrusion press equipment for the manufacture of brass rod. This machine will be in operation during the early part of May next, and the company states that, with its present equipment in the new rod mill, its output will be increased to over 5,000,000 pounds of finished rod monthly. The new mill for sheet metals will also be in full swing by May, 1917, increasing the capacity of the sheet mills to over 5,000,000 pounds monthly, and the entire production of the plant will then exceed 10,000,000 pounds of metal per month. The company is also erecting an office building adjacent to its mills.

INCREASE IN CAPITAL STOCK

The Michigan Brass & Electric Company, Lansing, Mich., has increased its capital stock from $10,000 to $25,000.

CHANGE IN FIRM NAME

The Ayer Manufacturing Company, manufacturers of equipment and supplies for plating plants, Meriden, Conn., has changed its name to the Ayer-O'Connell Manufacturing Company.

ELECTION OF OFFICERS

The following officers were elected at the annual meeting of the directors of the International Silver Company, Meriden, Conn., on March 26: George H. Wilcox, president; George C. Edwards, of Bridgeport, first vice-president; George D. Munson, second vice-president; C. H. Tibbits, of Wallingford, third vice-president; Frary Hale, treasurer; George Rockwell, of Waterbury, secretary; C. E. Breckenridge, of New York, assistant treasurer; C. Berry Peets, auditor. Mr. Munson succeeds C. A. Hamilton, of New York, as second vice-president.

REMOVALS

The W. H. Rogers-Davis Company, Inc., manufacturer of cutlery, etc., will move its plant from Plainfield, N. J., to Lansdale, Pa.

The building at 17 John street, New York, which is located about 50 feet from the sidewalk, behind other buildings, is to be torn down to make way for some improvements to the property, and, due to this fact, several nickel plating concerns are moving to new quarters. Charles Boyd is changing his address to 79 Cliff street. Herder & May are going to 21 Gold street, while Frick & Klein have not come to a decision as to their new location.

PAINT MANUFACTURERS CONSOLIDATE

At a recent meeting of the stockholders of the Harrison Brothers & Co., Inc., paint manufacturers, Philadelphia, Pa., the offer of the Du Pont Company, Wilmington, Del., to purchase the business for $5,700,000 was accepted, and the Harrison company now becomes merged with that of the Du Pont corporation, and the consolidated company will operate under a new Pennsylvania charter, and will be known as Harrisons, Inc. This move has been taken on the part of the Du Pont Company in anticipation of the expansion expected in the manufacture of paints, colors, varnishes and pigments, and although the Du Pont Company already manufactures and has on the market a number of enamels, lacquers and similar articles, the present Harrison plant will afford excellent facilities for taking care of future business.

GORHAM MANUFACTURING CO. MEETING

The annual corporation meeting of the stockholders of the Gorham Manufacturing Company was held at the Elmwood plant, Providence, R. I., on March 14, with 42,497 shares represented, either in person or by proxy. The proposed changes in the by-laws were accepted and it was unanimously voted to increase the capital stock to $6,000,000 by the issue of 10,000 shares at $100 each, the additional shares to be preferred stock of the same class and condition as that now outstanding. The following were elected as directors for the ensuing year: Edward Holbrook, Herbert J. Wells, John S. Holbrook, John F. P. Lawton, E. Frank Eldrich, Russell Grinnell, Henry S. Sprague, Frank W. Matteson, Robert L. Knight and Barton P. Jenks. The directors organized and elected the following officers: President and treasurer, Edward Holbrook; vice-presidents, John S. Holbrook and Barton P. Jenks; secretary and assistant treasurer, John F. P. Lawton; assistant secretary and assistant treasurer, William S. Stone; works manager, Frank M. Graham; and superintendent, Adolph Erichsen.

PHELPS, DODGE & CO. REPORT

Phelps, Dodge & Company, New York, the metal mining and marketing firm, earned last year a net income of $24,030,905, an increase of $13,049,393, or 228 per cent. over the preceding year. As applied to the outstanding stock, the profit was equivalent to more than $53 a share. Stockholders received $14,625,000, against $9,000,000 in 1915, and after $2,056,905 had been set aside for depreciation, the balance of $7,309,263 was added to the surplus account.

The balance sheet showed cash, as of December 31, amounting to $7,746,520, almost $2,000,000 more than a year before, while metals on hand to a value of $7,993,924 were worth $3,440,000 more than the supply in 1915. The company produced 152,263,729 pounds of copper, 10,404,341 pounds of lead, 1,642,055 ounces of silver, and 28,873 ounces of gold. A heavy tonnage of ores was bought and refined, and the total of copper sold from the plants was 247,303,587 pounds, at an average price of 24.48 cents a pound, delivered at New York. Less than half the copper output went to the foreign trade.

INDUSTRIAL EARNINGS

The Yale & Towne Manufacturing Company, Stamford, Conn., reports for the year ended December 31, 1916, net earnings of $3,386,426, a gain over 1915 of more than 61 per cent. After paying dividends, and allowing $662,579 for depreciation, there remains for the supplies $1,210,308, swelling the total reserve to more than $7,200,000.

The Baltimore Tube Company, Baltimore, Md., which began business on January 25, 1916, reports earnings from sales of $880,000 for the period ended December 31, 1916, and a net profit of $663,000, equivalent to 26 per cent. on the stock. Charles S. Morse, president, says that the capacity of the company is sold for the first six months of 1917, and that the outlook for future business is satisfactory.

The E. W. Bliss Company, Brooklyn, N. Y., practically doubled the earnings of 1915 in its operations last year with a total net revenue amounting to $10,465,321, against $5,532,101 the year before. The company handled big war orders for shells and tor-

pedoes, and as its outstanding common stock amounts to no more than $1,250,000, the net income available for dividends on the junior stock issue was equal to $418.16 per share of $50 par value, or more than 836 per cent. The dividend distribution, totaling $4,093,750 on the common, was at the rate of more than $160 per share of stock.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the name of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture metal articles.—Meltzer & Karron, Inc., Brooklyn, N. Y. Capital, $20,000. Incorporators: L. Siegel, L. Karron and H. Meltzer.

To deal in gold, silver and jewelry.—Louis Gilly Company, Newark, N. J. Capital, $10,000. Incorporators: Louis Gilly, Victor Blindt and Frank B. Byrns.

To manufacture chemicals for treating copper, etc.—Latem Metal Company, Newark, N. J. Capital, $35,000. Incorporators: George C. Helmick, William H. Perrine, Ernest H. Fougner.

To manufacture all kinds of metal goods.—A. W. Wheaton Brass Works, Newark, N. J., Capital, $40,000. Incorporators: Abram W. Wheaton, Sr., Abram W. Wheaton, Jr., and Walter Wheaton.

To manufacture metal goods.—The Olson Manufacturing Company, Worcester, Mass. Capital, $25,000. Incorporators: Robert C. Olson, president and treasurer; R. F. Olson and H. P. Olson.

To manufacture metal products.—The Fremont Metal Products Company, Fremont, Ohio. Capital, $10,000. Incorporators: S. A. Proctor, C. J. Christy, E. B. Smith, Vilas Daugharty and George H. Haskell.

To deal in brass and metal.—The Weber Brass Company, Cleveland, Ohio. Capital, $15,000. Incorporators: Beatrice Friedman, Florence Sturtevant, Y. H. Federman, M. M. Prentice and E. M. Bradley.

To manufacture metal articles.—The F. J. Nice Burner Company, Cleveland, Ohio. Capital, $1,000. Incorporators: Charles Burton, W. M. Harty, F. J. Nice, Sr., Lucius R. Landfear and Blanche C. Roberts.

To manufacture metal articles.—The Swastika Flexible Metals Company, Cleveland, Ohio. Capital, $250,000. Incorporators: Lewis C. Pritchards, Urah R. Talbot, Maurice Maechke, Edgar M. Hirsh and James Mathews.

To manufacture brass and aluminum castings.—The Arth Brass & Aluminum Castings Company, Cleveland, Ohio. Capital, $25,000. Incorporator: Michael Arth. A smelting and refining department, brass foundry, grinding room and casting shop will be operated by this company.

To manufacture a general line of metal stampings.—The Battle Creek Stamping Company, Battle Creek, Mich. Capital, $10,000. Incorporators: W. D. Baker, president; L. W. Macomber, vice-president; S. B. Hollman, secretary, and S. C. Coleman, treasurer. The company has just put in operation a plant which has been equipped with about $2,000 worth of machinery.

To manufacture brass, bronze and aluminum.—McKenna Brass & Manufacturing Company, Pittsburgh, Pa. Capital, $400,000. Incorporators: Charles H. McKenna and Otto Horix, general manager. The company will operate a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, cutting-up shop, spinning, stamping, brazing, tinning, soldering, plating, polishing and lacquering departments.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Plating Barrels.—The U. S. Electro Galvanizing Company, Brooklyn, N. Y., have issued a very interesting little booklet, which contains complete description of the U. S., Jr., plating barrel, and washing and drying apparatus for all kinds of small metal articles in large quantities.

Elevators.—Bulletin No. 50, entitled "The Revolvator," twenty-four pages, just published by the N. Y. Revolving Portable Elevator Company, 384 Garfield avenue, Jersey City, N. J., describes and illustrates their revolvator. This machine is a portable elevator or tiering machine with a revolving base, which can swing around on its own center like a turntable.

Metal Working Machinery.—The P. Pryibil Machine Company, New York, have issued catalogue No. 12, which consists of thirty pages, giving complete descriptions and illustrations of the extensive line of metal spinning lathes and accessories that they manufacture. This catalogue, which will prove valuable to those engaged in the metal working business, may be had upon request.

Dynamite.—The Du Pont Company, Wilmington, Del., has sent out an interesting circular containing suggestions as to how home farming may be made to relieve the cost of living. This suggestion is that every man be his own gardener, and to this end the Du Pont company advise the use of dynamite, which it is said permits ample storage of water from the spring rains by the breaking up of the sub-soil.

Cranes.—The Whiting Foundry Equipment Company, Harvey, Ill., have recently issued catalogue No. 127, giving description of their extensive line of cranes of all types for use in foundries and engineering installations. This catalogue, which supersedes No. 110, may be had upon request. A new catalogue has been issued by the same company descriptive of the Watters bucket used in foundries for handling sand and coal in power stations. This catalogue is numbered 126.

South American Year Book.—As a result of the war, the "South American Year Book," the standard reference work on South America, is hereafter to be edited and published in the United States by the Americas Publishing & Printing Corporation, with offices in the Evening Post building, 20 Vesey street, New York. Heretofore this work has been published by the Louis Cassier Company, Ltd., London. It is the intention to increase the value of the book for the people of this country by editing it from an American standpoint. In furtherance of this idea, special attention will be given to information helpful to the extension of American commercial and financial interests in South America. The 1917 edition will appear in September. It will have the most complete map of South America so far printed, 30x40 inches, in full color, compiled by Alexander Gross, F. R. G. S.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE

NEW YORK, April 2, 1917.

COPPER.

Standing out most prominently in March was the offer of the largest producers to furnish the United States Government 45,510,000 pounds of copper, in the next twelve months, at 16.6739 cents per pound—the startling fact to the trade being the price, which was something less than half the figure at which copper was held throughout the entire month.

During the first ten days, prompt and March electrolytic and prime lake copper were held at 36.25 to 36.50 cents per pound; April at 36 cents; May at 35.50 cents, and June at 34 cents; third quarter, 31.50 to 32 cents, and last half, 30.50 cents. By the middle of the closing week the Laurel Hill strike was adjusted, with concessions made by both sides; freer offerings for resale metal were made, and a willingness noted among the smaller producers to accept concessions in prices for deliveries after July.

TIN.

The tin story for March records wide fluctuations in prices as the most interesting feature. The foreign market declining quickly and advancing sharply had its reflection shown in the proportionate changes here, which up to the middle of the closing week registered a net advance of £16 abroad, and 6 cents per pound here. By March 26 arrivals were only 1,600 tons, and spot Straits in New York sold at 56.75 cents; spot Banca sold at 55.50 cents, and May arrivals of Banca at 52.50 cents per pound. The cheapest tin obtainable in New York from the East Indies was the August-September position, which was held at 51.50 cents.

LEAD.

Lead was scarce at the beginning of March, and demand was small, when on the 2nd the official price of the Trust was advanced, for the second time in less than one month, to 9 cents base New York, and to 8.92½ cents St. Louis, or a total advance of 2.60 cents for the year; from 6.40 cents on March 3, 1916, to 9 cents New York on March 2, 1917. April shipments were up ¼ cent. By the 6th the market was very strong and excited in St. Louis, with large sales of April shipments, and prices advanced 1 cent per pound to 10 to 11 cents New York, and to 9.50 to 10 cents St. Louis. About the middle of the month, export figures were discontinued by order of the United States Government. From this time on, there were more liberal offerings of prompt lead, with prices ⅛ cent easier on the 20th, when several carloads sold at 9.62½ to 9.75 cents f. o. b. New York. In the West there were free offerings at 9.50 cents. Up to the middle of the closing week, prices remained unchanged, with steady but not large business. Joplin ore on the 26th was down to $115.

SPELTER.

After two months of continued dullness in the buying of spelter by consumers and exporters, March began with prominent trading interests buying at 10.50 cents, which was looked upon by some traders as an effort to bring consumers into the market and also to establish a more profitable level upon which to sell second-quarter-delivery spelter. By the 26th, prices were up ⅛ cent to 10.80 cents bid for prompt-March New York, and 10.92½ cents asked; April, 10.42½ cents bid and 10.55 cents asked, while at East St. Louis, prompt-March, 10.62½ cents was bid, 10.75 cents asked, and for April, 10.25 cents was bid and 10.37½ cents asked. A somewhat firmer tone was evident, but with light business transactions, there was some talk of curtailment in production unless an improvement should develop.

ANTIMONY.

With easier prices prevailing for antimony at the opening of March, it was not long until irregularities developed, owing to the presence of American antimony, claimed to be of the same purity as Japanese and Chinese, which came into the market at 2 cents per pound under the foreign metal. On the 26th of the month, acute shortage in spot stocks carried prices to 35 cents; April to 25 cents bid, and May offered at 18.50 cents, duty paid. Prices in bond from the Orient were very firm at 15.50 cents for March; at 14.50 for April, and at 14 cents for May.

ALUMINUM.

A somewhat firmer tone in the aluminum market was noted at the beginning of March, with prices up 1 cent per pound on the different kinds. In the closing week, the export inquiries had not yet developed into orders, and on the 26th, with spot aluminum growing scarcer, prices were 59 to 61 cents for No. 1 Virgin; 55 to 56 cents for 98 to 99 per cent. pure, remelted, and 39 to 41 cents for No. 12 alloy, remelted.

SILVER.

The recession in the price of silver which began in February continued fractionally to 76½ cents on March 4, then gained ⅛ cent for one day, only to fall again, and by March 26 had broken to 71⅞ cents. Transportation costs were increased from 1 per cent. to 2 per cent. The American Smelting & Refining Company is now producing silver at the rate of 100,000,000 ounces annually.

QUICKSILVER.

Quicksilver fell from $125 per flask on March 1 to $108 by the 7th, owing to the fact that buyers could purchase in England and have it shipped to them for less money than it could be bought at home. It remained at $108 for about one week and then in sharp advances rose to $120 by March 20, where it still remained on March 26.

PLATINUM.

The scarcity of platinum during the first fortnight in March failed to affect prices in any way, relief being expected through new supplies from the fields of Colorado which, reports said, were to be developed. Prices were stationary throughout the month at $105 for pure and at $110 for 10 per cent. Iridium.

OLD METALS.

Following the heavy February business, stocks of old metals were found to be scant at the beginning of March, with very firm prices. Copper and brass were in best demand, with zinc scrap next. Heavy demand for all kinds continued all over the country, with sales of brass trimmings frequent and prominent in 50 to 100 tons lots. Aluminum scrap then became very active, advancing 2 to 3 cents per pound, in as many days, the demand being mainly from the West. Scrap pewter, block tin pipe and tinfoil rose 1 cent per pound, while heavy red and yellow brass advanced 25 cents per 100 pounds during the first half of the month. In the last half activity lessened somewhat, but prices were unwavering up to the 23rd. German silver experienced the biggest demand in years. The government contract for copper at about one-half prevailing prices, caused a sudden cessation in old metal business for one day, large users of scrap being nonplussed and feeling much uncertainty as to future developments. Irregularity in prices was immediately apparent, but with a thorough understanding of the patriotism that backed the procedure, confidence was restored, with slightly easier prices noted on the 26th.

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

Lake Copper, 1916—Average for year, 28.77. 1917—January, 32.25. February, 35.25. March, 35.50.

Brass Mill Spelter, 1916—Average for year, 17.725. 1917—January, 13.05. February, 13.80. March, 13.45.

MARCH MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER			
Lake	36.00	34.50	35.329
Electrolytic	37.00	34.00	35.739
Casting	34.00	30.75	32.176
TIN	56.625	51.50	54.364
LEAD	11.00	9.50	10.023
SPELTER	11.05	10.55	10.824
ANTIMONY	36.00	30.00	32.75
ALUMINUM	61.00	58.00	59.227
QUICKSILVER (per oz.)	$120.00	$105.00	$114.659
SILVER (cts. per oz.)	76.625	71.75	73.861

Metal Prices, April 2, 1917

NEW METALS.	Price per lb.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Lake, carload lots, nominal	35.00
Electrolytic, carload lots	34.50
Casting, carload lots	31.25
TIN—Duty Free.	
Straits of Malacca, carload lots	54.50
LEAD—Duty Pig, Bars and Old 25%; pipe and sheets.	
20%. Pig lead, carload lots	9.00
SPELTER—Duty 15%.	
Brass Special	10.75
Prime Western, carload lots, nominal	10.67
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.	
Small lots, f. o. b. factory	67.00
100-lb. f. o. b. factory	63.00
Ton lots, f. o. b. factory	59.00
ANTIMONY—Duty 10%.	
Cookson's Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	36.00
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.	
Shot Placquettes, Ingots, Blocks	50.00
ELECTROLYTIC—5 cents per pound extra.	
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	$3.50
BISMUTH—Duty free	$3.00
CADMIUM—Duty free	nominal $1.50
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	$1.70
QUICKSILVER—Duty, 10% per flask of 75 pounds	$120.00
PLATINUM—Duty free, per ounce	$102.00 to $105.00
SILVER—Government assay—Duty free, per ounce	74.125c.
GOLD—Duty free, per ounce	$20.67

INGOT METALS.			Price per lb.
Silicon Copper, 10%	according to quantity		50 to 55
Silicon Copper, 20%	"	"	53 to 55
Silicon Copper, 30% guaranteed	"	"	55 to 60
Phosphor Copper, guaranteed 15%	"	"	51 to 55
Phosphor Copper, guaranteed 10%	"	"	49 to 54
Manganese Copper, 30%, 2% Iron	"	"	65 to 70
Phosphor Tin, guaranteed 5%	"	"	66 to 70
Phosphor, Tin, no guarantee	"	"	55 to 60
Brass Ingot, Yellow	"	"	23 to 25
Brass Ingot, Red	"	"	29 to 31
Bronze Ingot	"	"	29 to 31
Parsons Manganese Bronze Ingots	"	"	33½ to 35
Manganese Bronze Castings	"	"	39 to 48
Manganese Bronze Ingots	"	"	28 to 34
Phosphor Bronze	"	"	34 to 36
Casting Aluminum Alloys	"	"	42⅞ to 45

Dealers' Buying Prices.	OLD METALS.	Dealers' Selling Prices.
29.00 to 30.00	Heavy Cut Copper	32.50 to 33.00
28.00 to 28.50	Copper Wire	30.00 to 30.50
24.00 to 25.00	Light Copper	26.00 to 27.00
23.00 to 24.00	Heavy Mach. Comp	25. to 26.50
15.25 to 16.00	Heavy Brass	17.00 to 18.00
12.00 to 13.00	Light Brass	13.50 to 14.30
18.00 to 19.00	No. 1 Yellow Brass Turning	19.00 to 20.00
16.25 to 17.00	No. 1 Comp. Turnings	17.00 to 18.00
8.00 to 8.25	Heavy Lead	8.62 to 8.75
7.50 to 8.00	Zinc Scrap	8.50 to 9.00
18.00 to 20.00	Scrap Aluminum Turnings	20.00 to 22.00
29.00 to 30.00	Scrap Aluminum, cast alloyed	33.00 to 34.00
45.00 to 48.00	Scrap Aluminum, sheet (new)	48.00 to 50.00
32.00 to 33.00	No. 1 Pewter	34.00 to 35.00
28.00 to 30.00	Old Nickel	32.00 to 34.00
21.00 to 23.00	Old Nickel anodes	25.00 to 26.00

PRICES OF SHEET COPPER.

Mill shipments (hot rolled) ..... 44c. base net
From stock ..... 46c. base net

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 2c.

Metal Prices, April 2, 1917

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect November 18, 1916.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.43	$0.44½	$0.47
Wire	.43	.44½	.47
Rod	.43	.45½	.48
Brazed tubing	.48	—	.52
Open seam tubing	.48	—	.52
Angles and channels	.48	—	.52

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.45	$0.46½	$0.49
Wire	.45	.46½	.49
Rod	.45	.47½	.50
Brazed tubing	.50	—	.54
Open seam tubing	.50	—	.54
Angles and channels	.50	—	.54

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

38c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	47c.	per lb. base
100 lbs. to 300 lbs. in one order	47½c.	" " "
Less than 100 lbs. in one order	49c.	" " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, — per lb.
Seamless Copper Tubing, — per lb.

For other sizes see Manufacturers' List.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5

Due to fluctuations of the metal market we are unable to quote these prices.

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	42c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	38c.	" "
Muntz or Yellow Metal Rectcangular sheets other than sheathing	43c.	" "
Muntz or Yellow Metal Rod	39½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 65c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES OF NICKEL ANODES.

45 to 87% purity	47½c.	per lb.
90 to 92% "	50c.	" "
95 to 97% "	52½c.	" "

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Base price, 60c.

We are unable to quote these prices, but they can be had upon application to manufacturers and dealers.

PRICE LIST SEAMLESS ALUMINUM TUBING.

We are unable to quote these prices, but they can be had on application to manufacturers and dealers.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

We are unable to quote these prices.

PRICES OF SHEET ZINC.

Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill.....21 cent basis, less 8%	
Casks, jobbers' prices	22.00
Open casks, jobbers' prices	22½

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	48½c.	16%	53c.
8%	49½c.	18%	53½c.
10%	49¾c.	20%	55¼c.
12%	51½c.	25%	63c.
15%	52c.	30%	68½c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	50c.	15%	58c.
8%	52c.	16%	58½c.
10%	54c.	18%	60½c.
12%	56c.	30%	76c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 7c. over Pig Tin. 50 to 100 lbs. 8c. over, 25 to 50 lbs. 9c. over, less than 25 lbs. 15c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.

PRICES OF SOME METAL INDUSTRY CHEMICALS AND MATERIALS.

Phosphorus—Duty free, according to quantity	Nominal	
Nickel Salts, Single bbl	14c.	per lb.
Nickel Salts, Double bbl	11c.	" "
Sodium Cyanide	Nominal	
Silver Nitrate, 100 oz. lots	49.05c.	per oz.
Sodium Carbonate (Sal Soda)	.05c.	per lb.

Prices for Cotton Buffs.

Open buffs per 100 sections.

12 inch, 20 ply, 64/68, cloth	base	$30.90
14 " 20 " 64/68 "	"	40.00
12 " 20 " 84/92 "	"	37.30
14 " 20 " 84/92 "	"	48.35

Sewed buffs per pound.

Bleached and unbleached	base	30c.
Colored	"	27c.